

**ZEVATECH**

**PLACE-MAT 360  
TECHNICAL MANUAL**

For Reference Only

## THE EQUIPMENT

The ZEVATECH PLACE-MAT 360 is a low-cost desktop "pick-and-placer unit" with functions ranging from print circuit boards to hybrid ICs. Featuring a high-speed head that moves 450mm/second, it offers a centering adjust chuck mechanism and can mount up to 88 kinds of parts with speed and accuracy. As the preparatory setup time is short, the PLACE-MAT 360 is ideal for trial production and small-lot processing. It adapts itself to an abundant variety of options and, by attaching different feeders and an automatic conveying system, in-line production and "pick-and-placer" functions are possible.

## SPECIAL FEATURES

- A centering adjust chuck mechanism allows highly accurate mounting
- A maximum of 88 kinds of parts can be mounted
- An automatic conveying system makes in-line production possible
- Head movement speed of 450mm/second
- Trial production and small-lot processing at low cost
- Feeders can be freely selected for any type of packing
- Preparatory setup changes use a simple module-unit system

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# MAIN UNIT

Section **1**

## ◆◆◆◆◆ MAIN UNIT EQUIPMENT ◆◆◆◆◆

This section describes replacement, assembly, and adjustment procedures for the mechanical system of the main unit.

**1.**

### BELT SYSTEM

(1) Replacement procedure

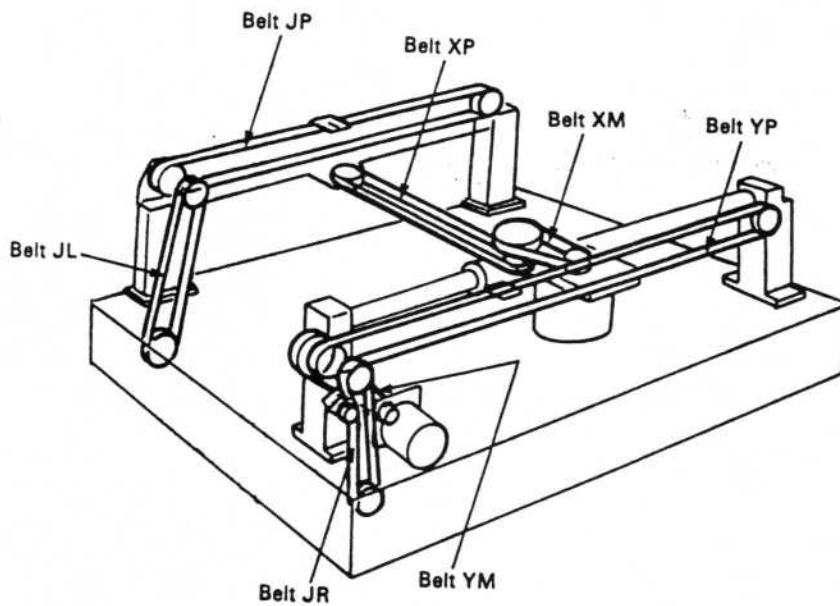
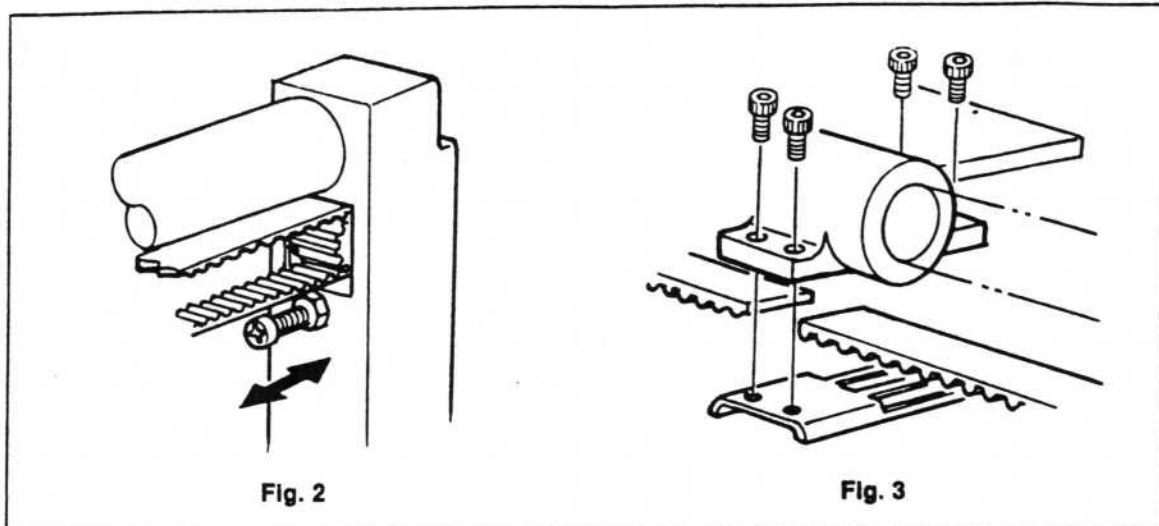


Fig. 1

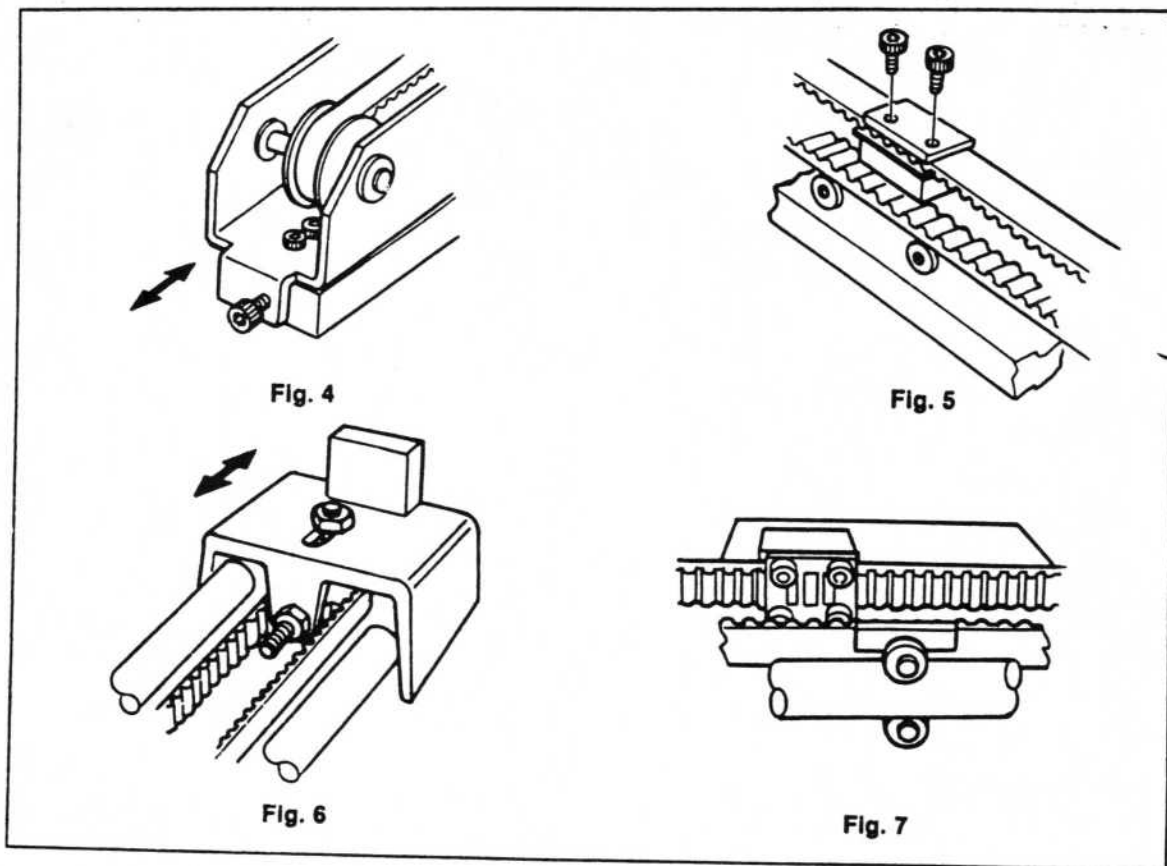


(a) Belt YP Figures 1,2,3

1. Loosen the tension adjustment screw shown in Figure 2.
2. Next, loosen the four screws that hold the Y belt holder on Slide Table A, and remove Belt YP (Figure 3).

(b) Belt JP Figures 1,4,5

1. Loosen the two screws holding upper bracket R as shown in Figure 4.
2. Next, loosen the two screws holding the J belt shown in Figure 5, and remove Belt JP.



(c) Belt XP Figures 1,6,7

1. Loosen the pulley tension adjustment screw shown in Figure 6, and unscrew the pulley shaft nut.
2. Next, loosen the four screws holding the X belt holder shown in Figure 7, and remove Belt XP.

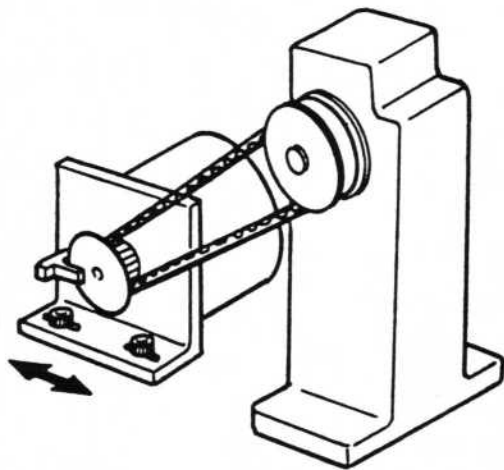


Fig. 8

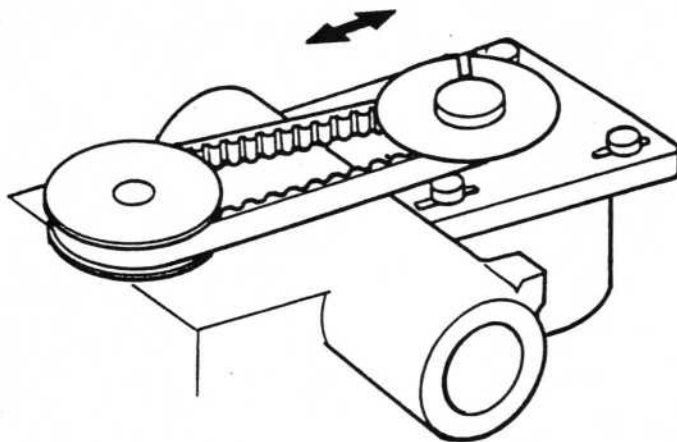


Fig. 9

(d) Belt YM Figures 1,8

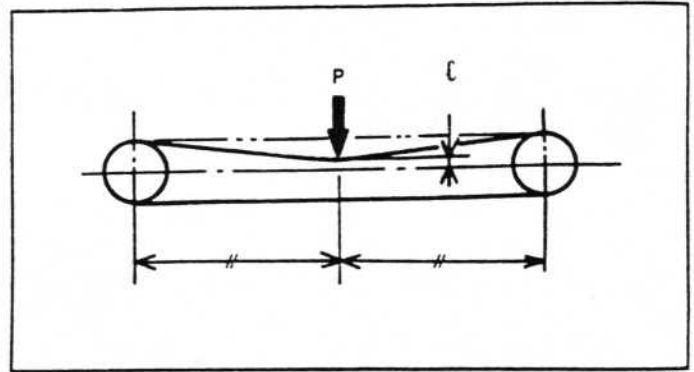
Loosen the two screws attaching the Y motor bracket, and remove the belt.

(e) Belt XM Figures 1,9

Loosen the four screws holding the X motor, and remove the belt.

(2) Adjustment

After replacement, the tension for each belt should be adjusted to the value given in the chart below.



Belt Name	Part Number	P	ℓmm	Notes
Timing belt YM	E2067760000	500gf	$1.5 \pm 0.3$	
Timing belt YP	E2068760000	500gf	$11.3 \pm 1$	
Timing belt JR	E2069760000	300gf	$1.9 \pm 0.3$	
Timing belt JL	E2070760000	(Value is determined by interval between pulley axes.)		
Timing belt JP	E2071760000	(400gf)	(10)	Rear upper bracket tension should be 6kg.
Timing belt XM	E2072760000	(200gf)	(1.4)	Motor tension should be 3kgf.
Timing belt XP	E2073760000	240gf	$10 \pm 1$	



## 2.

### RELATION BETWEEN X AXIS AND Y AXIS

(1) Positional relation of Y axis and base plate (Figure 10).

If Stand A or Stand AR has been loosened (for replacement of belts, guideshafts, slide tables, etc.), follow the procedure outlined below to adjust the relation of the position between the base plate and Guideshaft A (Y axis).

1. Set Jig A in the standard hole of the linear feeder in front of the M/C.
2. Set Jig B in the standard hole of the linear feeder in back of the M/C.
3. Set Jig C in the standard hole of the stick feeder in back of the M/C.
4. The front/rear direction of stands A and AR should be in contact with Jigs A and C.
5. Place Guideshaft A on Jigs A and B so that Slide Table A is positioned between Jigs A and B.
6. Press Stand A, Stand AR, and Guideshaft A against each jig, and fasten the four screws holding Stands A and AR.

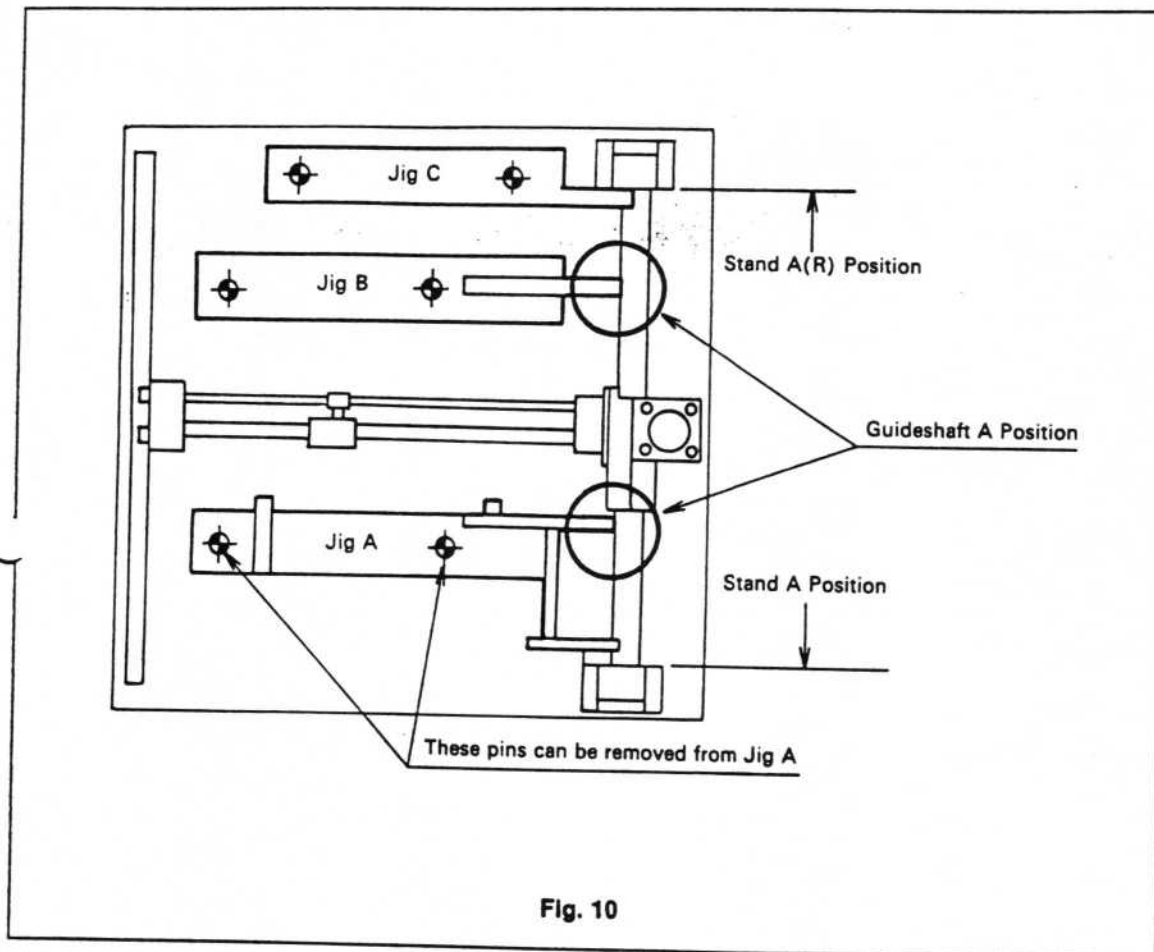


Fig. 10

(2) Adjusting the Squareness of the X and Y Axes Figures 1,4,8,11.

When replacing belts, after adjusting the belt tension, be sure to check and readjust the squareness of the X and Y axes.

1. Adjust the tension of all belts except Belt YM (Figure 8).
  2. Loosen the screws of the J1 pulley ONLY (lower left side).
  3. Set Jig A, used in 2-(1), in the position shown in Figure 11, without removing the two pins. At this time, Jig A should be adhered to the two pins.
  4. Gently draw the point on Slide Table A indicated with an arrow in Figure 11 towards you, until the X axis and Jig A are in contact.
  5. At this point, either contact point P or contact Q will be touching Jig A. The difference between the point where the X axis and Jig A touch, and the gap where they are not touching, should be 0.03mm or less. To achieve this difference, adjust the position of the J1 pulley and then apply the screw lock.
  6. If adjustment cannot be made as described in item 5, move the Upper Bracket and Upper Bracket R back and forth to make adjustments.
- Weld Belt JP so that no slack can develop in the tension.

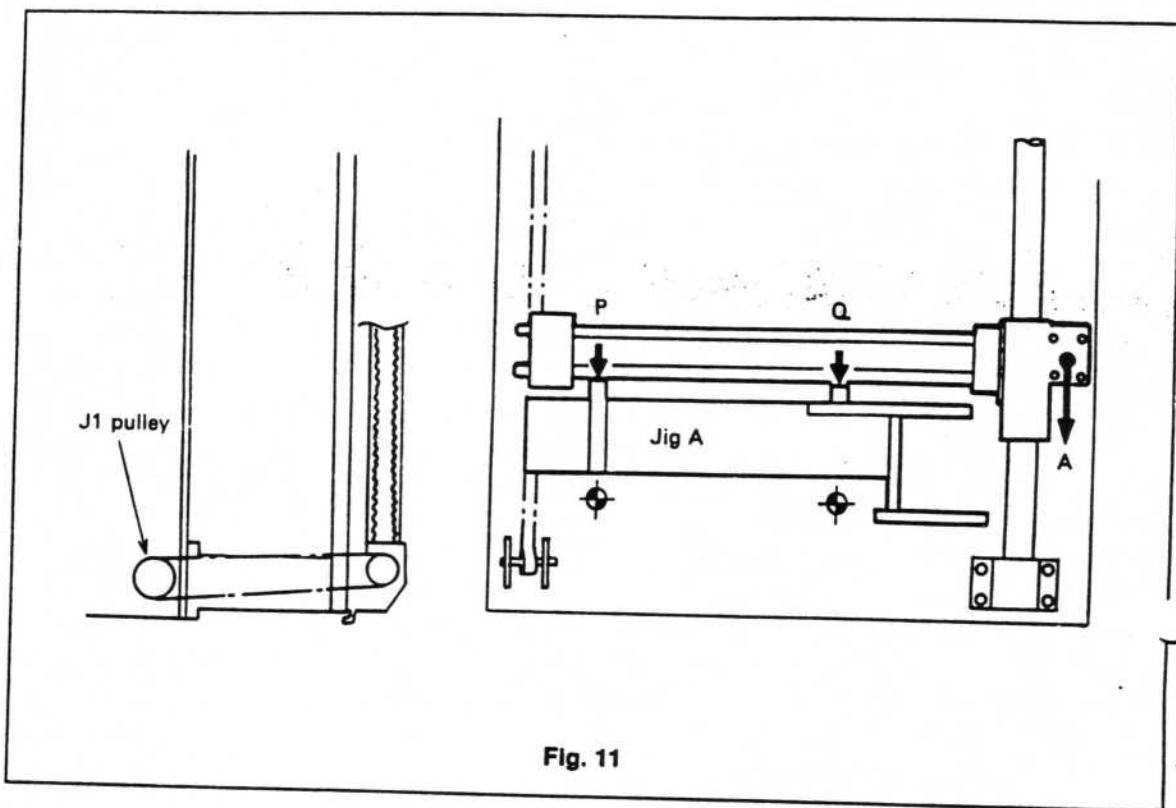


Fig. 11

### 3.

#### REPLACING THE AIR TUBE (FIGURES 12, 13, 14)

Use the following procedure to change the air tube.

1. Remove the air tubes connecting each of the one-touch joints of the head. To remove the tubes, pull the tube out while pressing the blue ring of the joint. To connect the tube again, insert the tube all the way to the back, and then pull on it to make sure it is secured. Square and cut the opening of the tube using the special cutter for that purpose.
2. Unfasten the spiral wrapping holding the bundle of tubes together and remove the two screws holding the tube port in place. Remove the tube port from the cover.
3. Take the tubes out of the tube port, and remove the bonds of the electromagnetic valve, air ports, pressure sensor, etc. (See Figure 13).
4. Prepare the bundle of tubes, each of which has been cut to a fixed length, by stamping each tube with a directional marking.
5. Connect the tubes as shown in Figure 13.
6. Pass the tubes through the tube port, and bind them with the spiral wrapping.
7. As shown in Figure 14, connect the tubes to the assigned locations on the head, following the arrows for each one.

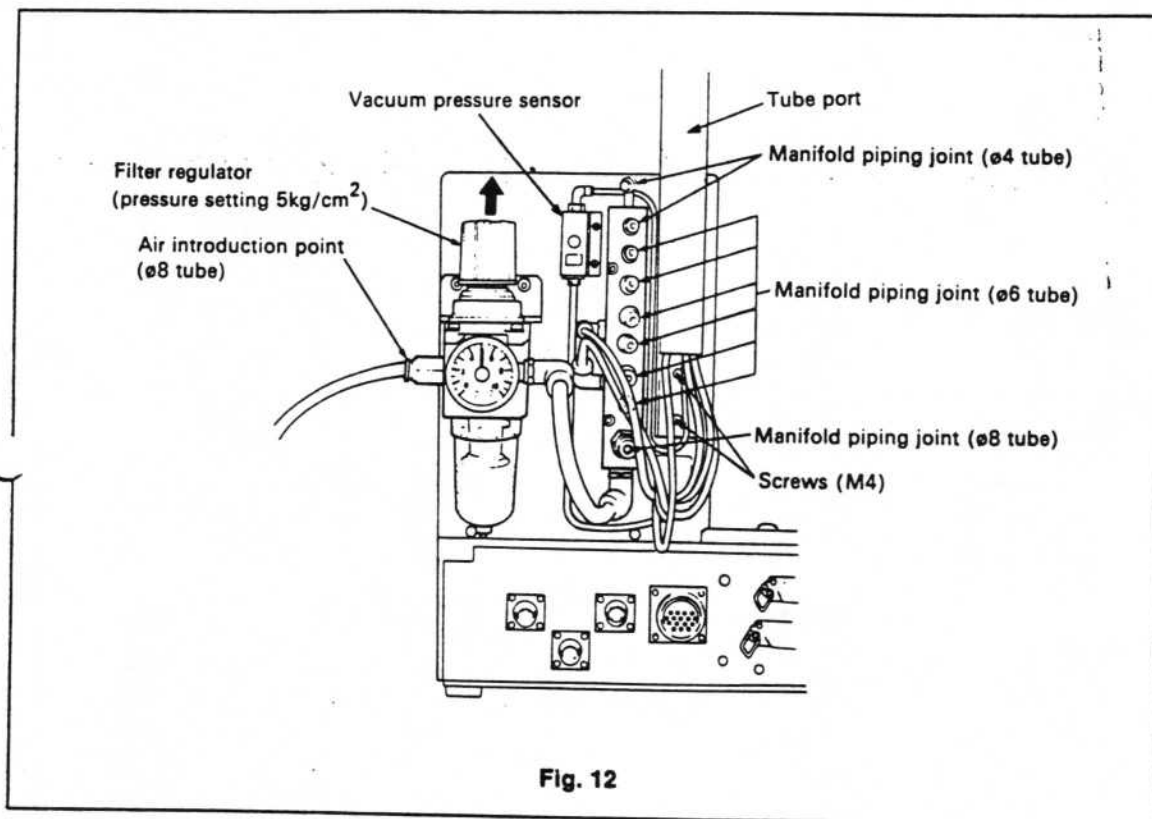


Fig. 12

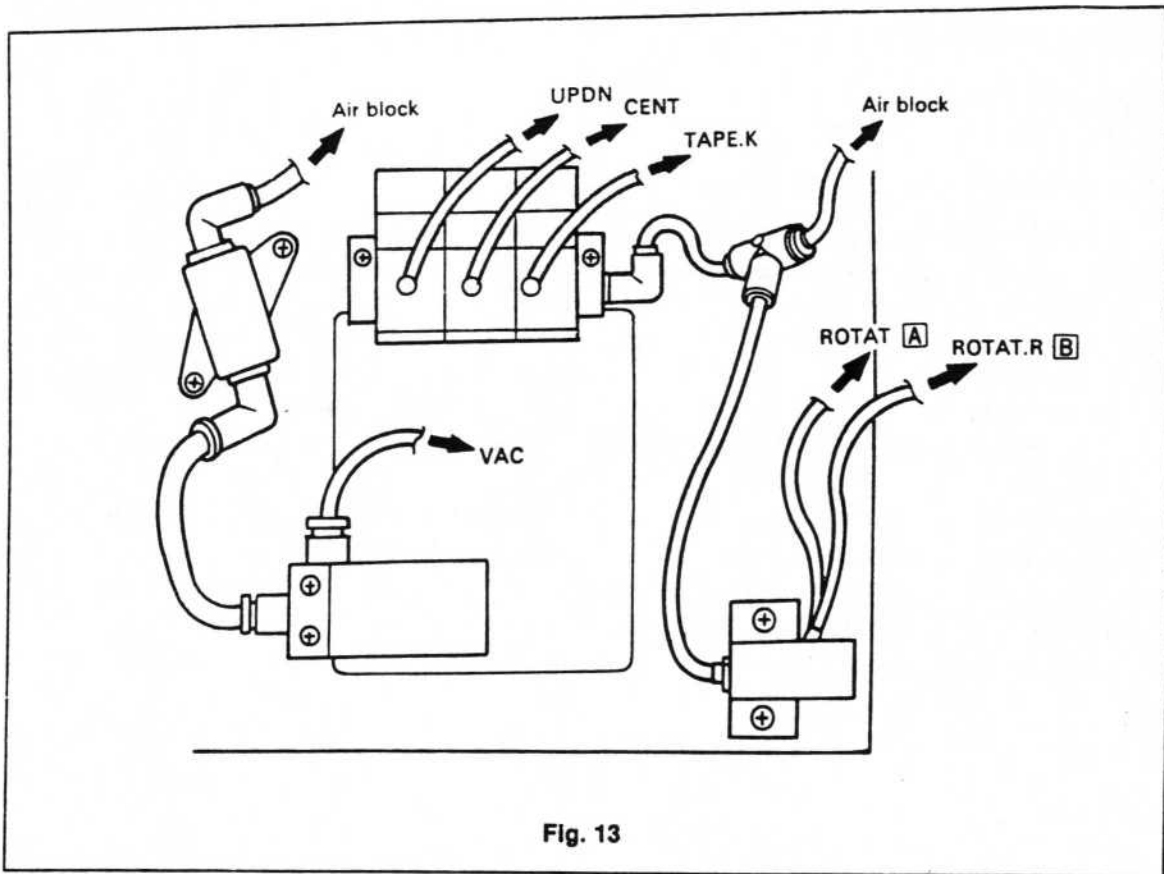


Fig. 13

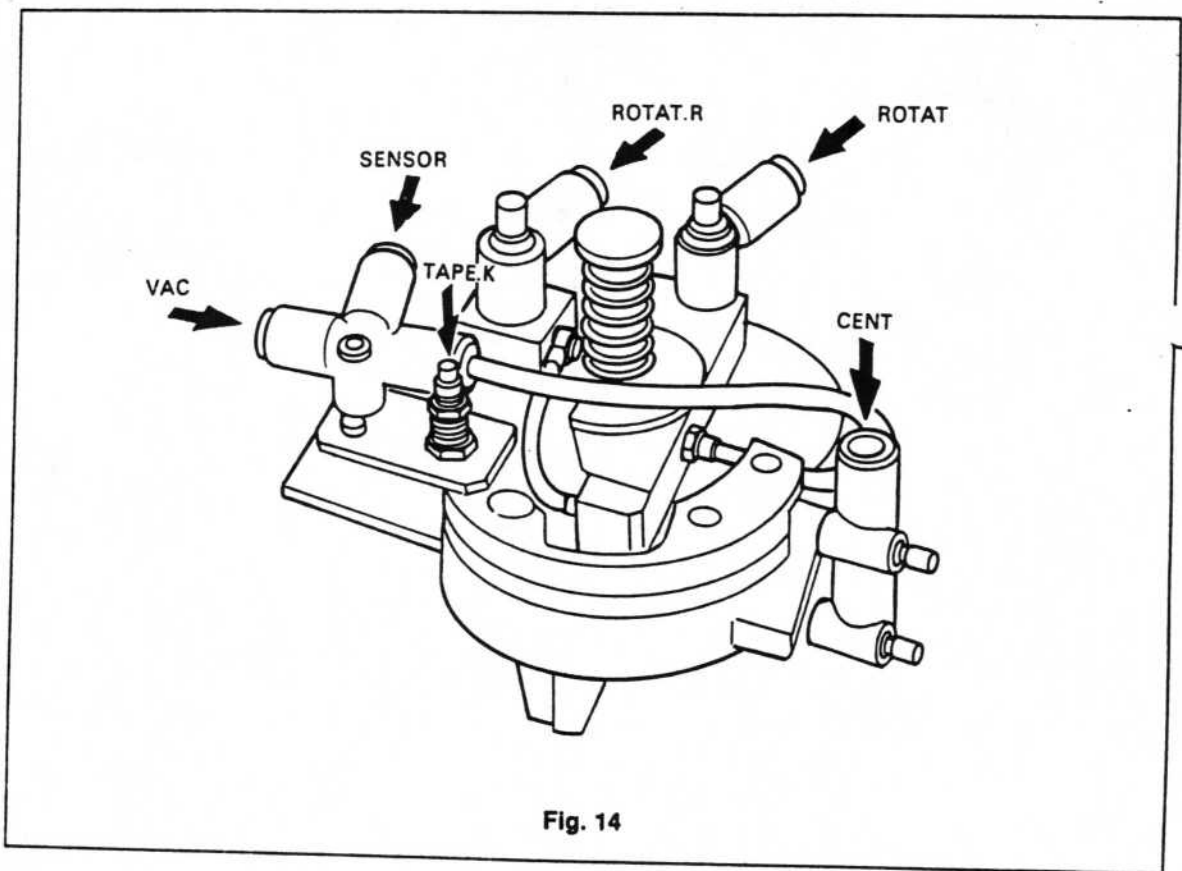


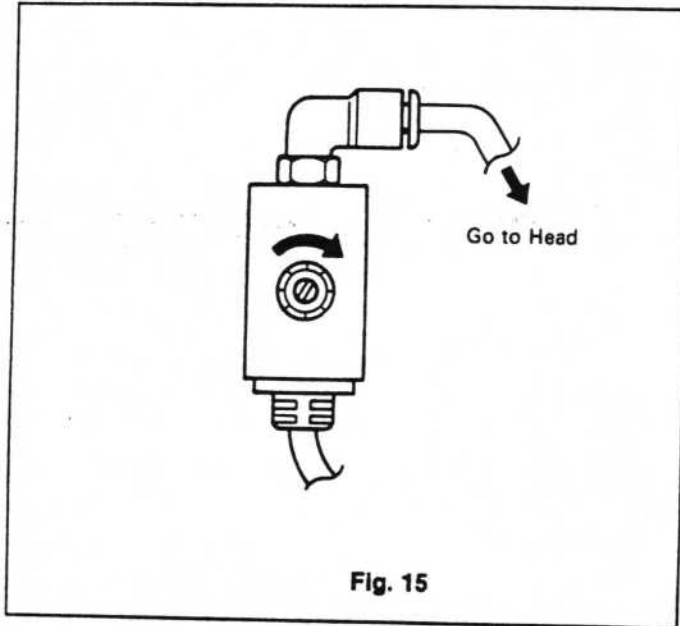
Fig. 14

## 4.

### **PRESSURE SENSOR (FIGURE 15)**

Be sure to readjust the pressure sensor when replacing the head. This is to make sure that the head provides vacuum channel dispersion.

1. Set the air pressure of the filter regulator to 5kg/cm<sup>2</sup>.
2. Replace the bit with Bit No. 1.
3. Perform a head check in test mode, and set the bit DOWN and vacuum ON.
4. Rotate the volume of the pressure sensor, and set it at the position at which the red indicator lights when there is no part.
5. Next, rotate the volume to the right until the red indicator goes out. Do not rotate it too far.
6. Set the unit to Re-try in the production mode. Using a 1/8 MELF, operate the unit for vacuum and loading. Make sure the Re-try function is operating correctly. When not using MELF, use a square chip to check the function. The output obtained with this method will be more stable than that with MELF.



**Fig. 15**

## 5. \_\_\_\_\_

### LUBRICATION

Lubrication Points	When to Lubricate	Usable Grease
① Guideshaft A	Running Distance 100km	A good-quality No. 2 grease with a lithium soap base, or similar grease
② Guideshaft B		
③ Guideshaft C		
③ Guidebar		

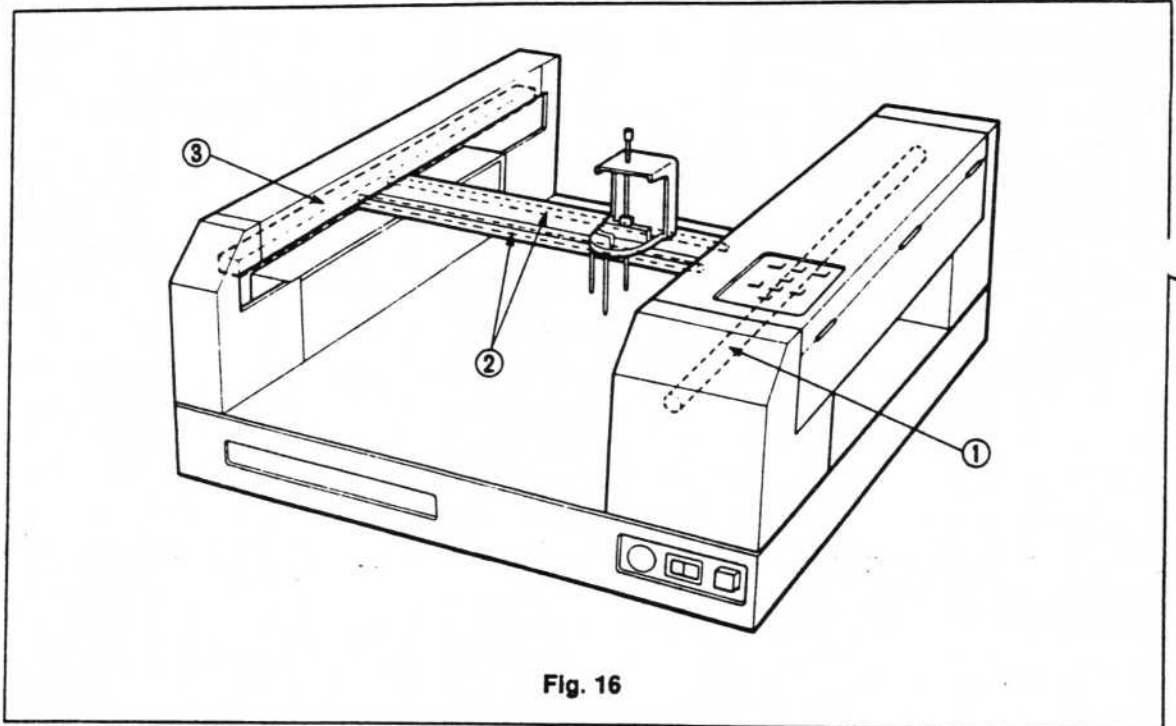


Fig. 16

- ① Guideshaft A  
Remove the two screws (M3 x 8) and open the RT cover.
- ② Guidshafts B and C  
Remove the six screws (M3 x 6) and take off the bail cover.
- ③ Guidebar  
Remove the seven screws (M3 x 8) and take off the LT cover.

**Note:**

Be careful not to get grease on the pulley belt surface or the belt.

## 6. \_\_\_\_\_

### PERIODIC INSPECTION

Inspection Points		Reference Figure	Checkpoints	Frequency
Head Drive Section	Belt	1 to 9	<ul style="list-style-type: none"> <li>•Belts are loose or have fallen off</li> <li>•Scratches or irregularities in belts</li> </ul>	Monthly
	X,Y driveshaft	10, 11	<ul style="list-style-type: none"> <li>•Noise during drive operation</li> <li>•Rattling, wear and tear</li> </ul>	Monthly
	Pulleys	1	<ul style="list-style-type: none"> <li>•Slack in pulleys</li> </ul>	
	Loading system	10, 11	<ul style="list-style-type: none"> <li>•Connection of Y axis to base</li> <li>•Squareness of X-Y axes</li> <li>•Loading startpoint</li> </ul>	As necessary
Air system	Electromagnetic valve	13	<ul style="list-style-type: none"> <li>•Check of operation noise</li> <li>•Clogged filter</li> </ul>	Bimonthly
	Air tubes	12, 13, 14	<ul style="list-style-type: none"> <li>•Presence of dirt</li> <li>•Presence of breaks or scratches</li> <li>•Presence of water droplets</li> </ul>	Monthly
	Filter regulator	2	<ul style="list-style-type: none"> <li>•Drain check</li> <li>•Clogged filter</li> </ul>	As necessary
	Pressure sensor	15	<ul style="list-style-type: none"> <li>•Operation of check indicators</li> <li>•Presence of water droplets from air tubes</li> </ul>	Monthly

# 7.

## TROUBLESHOOTING

Problem	Checkpoint	Ref. Item
(1) Loading accuracy is bad.	— Loading home position	Home position adjustment
	— Y axis accuracy	2-(1)
	— Squareness of X-Y axes	2-(2)
	— Slackness in X-Y belt	1-(2)
	— Rattling in guideshaft section	
	— Assembly board receptor attachment	
	— Automatic assembly board conveyor attachment	
(2) Operation of air mechanism is bad.	— Specified air pressure	3
	— Electromagnetic valve	3
	— Pressure sensor adjustment	4
	— Breaks in air pipes	3
	— Dirt in air pipes or head section	3
	— Air leak	3, 4
	— Water mixed with air	3
	— Clogged filter, water in filter	3



## ◆◆◆◆◆ MAIN UNIT ELECTRICITY ◆◆◆◆◆

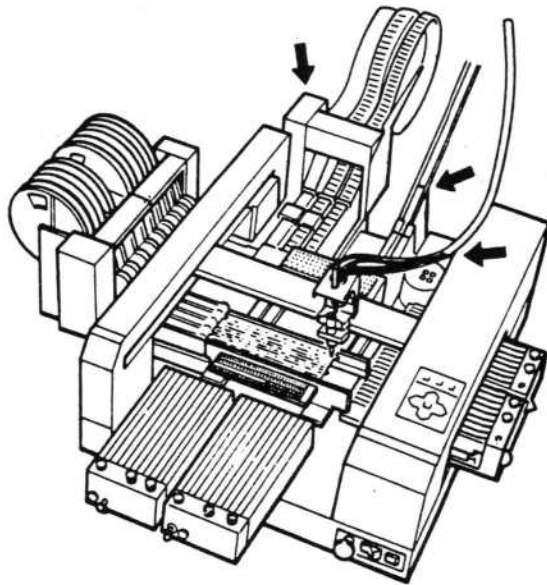
### 1.

#### **ELECTRICITY FLOW ADJUSTMENT**

##### **1. Preparation for Electricity Flow Adjustment**

- 1) Turn off power to the main unit, and disconnect the AC input cord.
- 2) As shown in the example in Figure 1, remove all units on the rear side of the main unit.
- 3) Remove the connectors between all other units and the main unit control section. For the automatic conveyor, it is sufficient to remove only the connecting cable.
- 4) Remove the screws from the control box on the rear side of the main unit, and pull the box out so it is about halfway separated from the unit.

At this time, set the wiring support securely on top to keep it out of the way. Then, to balance the control box so it doesn't fall, set a block beneath it for support. Pull the wiring out gently so as not to damage it.



**Fig. 1 Removing the Units on the Rear Side  
(Arrows indicate units to be removed.)**

## 2. Electricity Flow Adjustment When No Options Are Attached

Please refer to figure 6 for the arrangement of parts inside the control box. Connect two interface cables between the main unit and a personal computer. Adjust the electricity flow as follows:

- 1) Before turning on the power, do a test check to make sure there is a power line of +24V, +5V, and that there is no short circuit in the line or in the voltage.
- 2) Test to make sure there is no short circuit between the main unit frame and the AC 100V line, or the 100V line. With the AC input cord disconnected, turn the main unit power switch on and do a test check. After the test check, turn the main unit power switch off again.
- 3) Connect the AC input cord.
- 4) Turn on the main unit power switch.
  - 4-1) Three fans should be rotating smoothly, the Y axis motor cooling fan, and two motor driver air cooling fans in the PS drawer.
  - 4-2) Check that the +5V and +24V power source LEDs are lighted. The power switch indicator of the main unit should also be lighted.
  - 4-3) Check carefully for unusual heat or odors, and broken fuses.
- 5) Turn on power to the computer and the display.
- 6) Insert the system disk in Drive 1 of the computer, and press the reset button (System Disk).
- 7) The Main Menu will be displayed on the screen. Press **4** and then **RETURN** on the computer keyboard. By doing this, you have selected "4. Test."

**Note:**

If the Main Menu does not appear, check the expansion slot board again.

- 8) "i/O TEST" will be displayed on the screen.

- |                       |
|-----------------------|
| 1. Input check        |
| 2. Head               |
| 3. XY Movement        |
| 4. R Table            |
| 5. Automatic Conveyor |
| /. End                |

\* "XY Movement" is executed only after Home Position adjustment has just been completed.

- 9) Press **1** and then **RETURN** on the computer keyboard to perform an input check.

Item	Input	Item	Input	Item	Input
HEAD	off	-Y	off	HOME	off
VAC	off	+Y	off	R.T (CTR)	off
TEACH	off	-X	off	R.T (CW)	off
FAST	off	+X	off	R.T (CCW)	off

The above screen will be displayed.

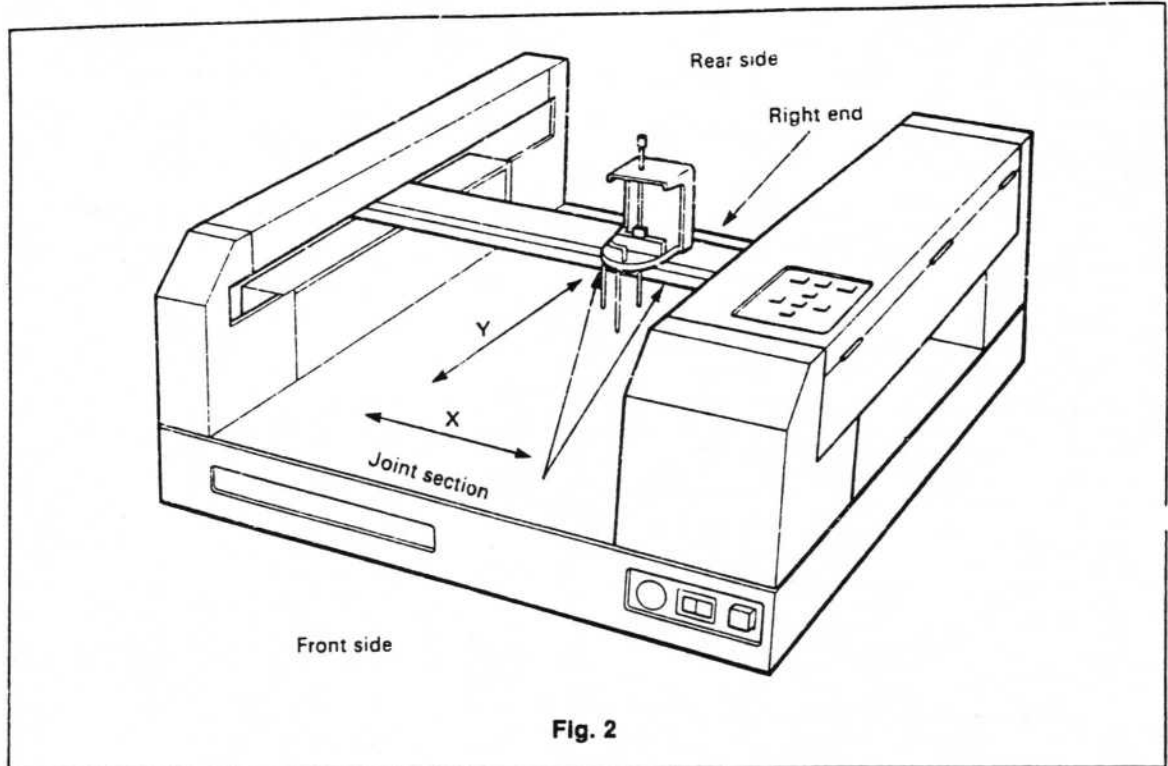
- 10) Press the Operation Panel (O/P) switch of the main unit, and check that the screen input column has changed to "on". If the input column of another item has changed to "on", there is a strong probability of a wiring error, faulty connections, faulty I/O assembly board, or O/P assembly board when the relevant unit is in the "off" position. Hold down the operation O/P switch for that item and, with an oscilloscope, follow the O/P board from "H" to "L". (Refer to the circuit diagram.) Check the input signals at U2 and U1 of the I/O board. Check the following eight items: HEAD, VAC, TEACH, FAST, -Y, +Y, -X, +X.
- 11) Press the HOME key next to the power switch (on the main unit). Check that the screen shows HOME input as ON. If it is still "off" but another item has been turned "on", respond as outlined in item 10).
- 12) Press **[2]** and then **[RETURN]** on the computer keyboard to perform a "HEAD" check. The following screen is displayed.

Item	Operation	Output	Input
UP/DOWN	f-1	off	off
Rotation	f-2	off	***
Vacuum	f-3	off	off
Tape Knock	f-4	off	***
Centering	f-5	off	***
Dispenser	f-6	off	***

- 13) If you press **[f-1]** on the computer keyboard, the screen output column becomes "on" and the bit of the main unit is lowered. If **[f-1]** is pressed again, the column becomes "off", and the bit is raised. If this does not occur, use an oscilloscope to trace the signal from the I/O board U4-4 (HEAD signal), or trace the wiring of the load from the I/O board J6.
- 14) If you press **[f-2]**, the screen output column becomes "on" and the bit of the main unit is rotated 90 degrees. If this does not occur, use an oscilloscope to trace the signal from the I/O board U4-15 (ROTATION signal), or trace the wiring of the load from the I/O board J6.
- 15) In the same way, if **[f-3]** is pressed, air suction occurs at the bit tip. (VACUUM)  
I/O U4-17, J6-2
- 16) If **[f-4]** is pressed, the three tape knock pins are lowered.  
I/O U4-13, J6-10
- 17) If **[f-5]** is pressed, the four fingers are implemented. (CENTERING)  
I/O U4-6, J6-8
- 18) If **[f-6]** is pressed, the bit is lowered. (substitute dispenser test) If **[ESC]** is pressed, the dispenser becomes OFF (the bit is raised).  
I/O U3-6
- 19) If the **[ ]** key is pressed, the Main Menu screen reappears.
- 20) X-Y Movement Test

This should be implemented after Home Position adjustment of the main unit has been completed. Turn off the power to the main unit (refer to the relevant item), and perform X-Y movement manually. When you have confirmed that the head is in contact with the optional unit, perform the X-Y movement test. When performing manual X-Y movement, move to the following positions.

Y axis movement (front/rear)..... to the right end of the X axis  
 X axis movement (left/right)..... to the head joint



Take the disk out of the computer and turn off the power to the main unit, computer, and display.

**Note:**

When turning off power during a board or wiring check, make sure the disk is taken out of the computer before turning off the power. In order not to damage the disk, when resuming testing, go through steps 4 to 9 once again.

**3. Electricity Flow Adjustment When Options are Attached**

After adjusting the electricity flow when no options are attached, next attach the optional unit and adjust the electricity flow again.

- 1) Turn off power to the main unit, and disconnect the AC input cord.
- 2) Insert the control box slowly into the main unit. When doing this, be very careful not to damage the wiring bound with spiral wrapping.
- 3) Insert the screws into the holes on the control box (on the rear side of the main unit) and secure the control box firmly.
- 4) Attach the units necessary for loading, or the units for testing, to the base of the main unit.
- 5) Turn on the power to the main unit and insert the system disk in the computer. Insert the data disks in drives 1 and 2, and boot the system.

Proceed with steps 5) to 8) from item 2, "Electricity Flow Adjustment When No Options are Attached".

6) Rotary Table Input Check

On the I/O Test Menu, select "1. Input Check" and press the Manual Switch on the Rotary Table.

- R.T (CTN) .....  Centering
- R.T (CW) .....  Clockwise
- R.T (CCW) .....  Counterclockwise

As you press each key, check that the corresponding column on the display screen becomes "on".

7) Rotary Table Operation Check

On the I/O Test Menu, select "3. R Table" and confirm that the rotary table is operating. Please refer to the section called "I/O Test" in the KP-350 instruction manual for complete details.

8) Automatic Conveyor Operation Check

Confirm this the same way as the I/O test.

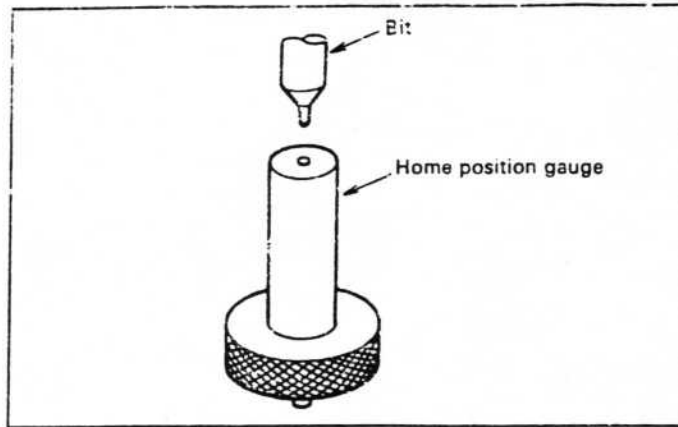
9) Dispenser

When the dispenser head has already been attached, select "2. Head" on the I/O Test Menu, and start operation by pressing the **[f.6]** key. Make sure the dispenser controller is in the timer mode. For details, please refer to the technical manual for the dispenser.

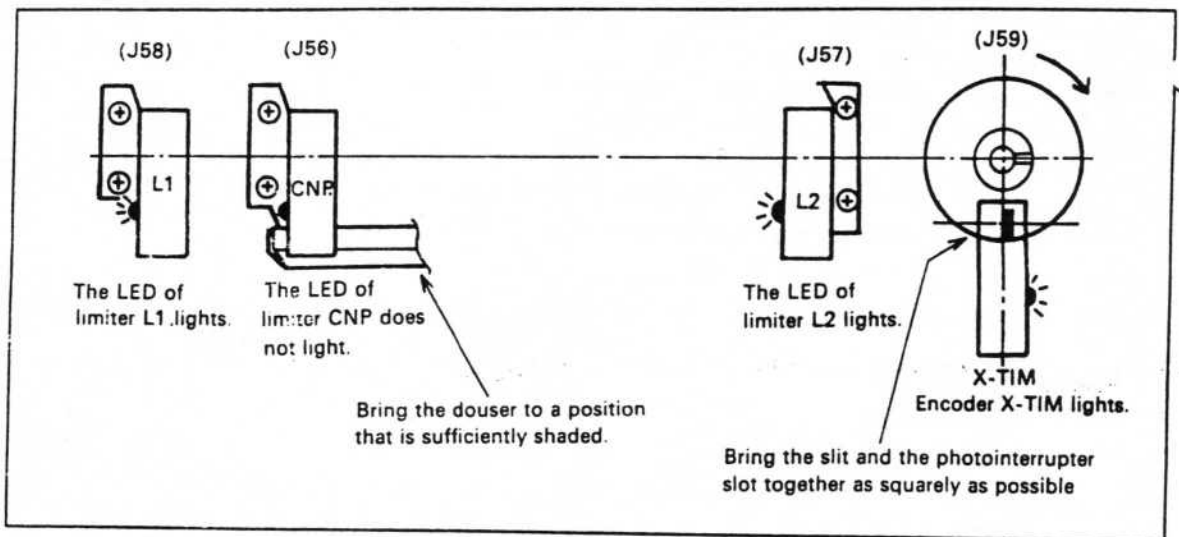
## 2.

### **ADJUSTING THE XY AXES HOME POSITION**

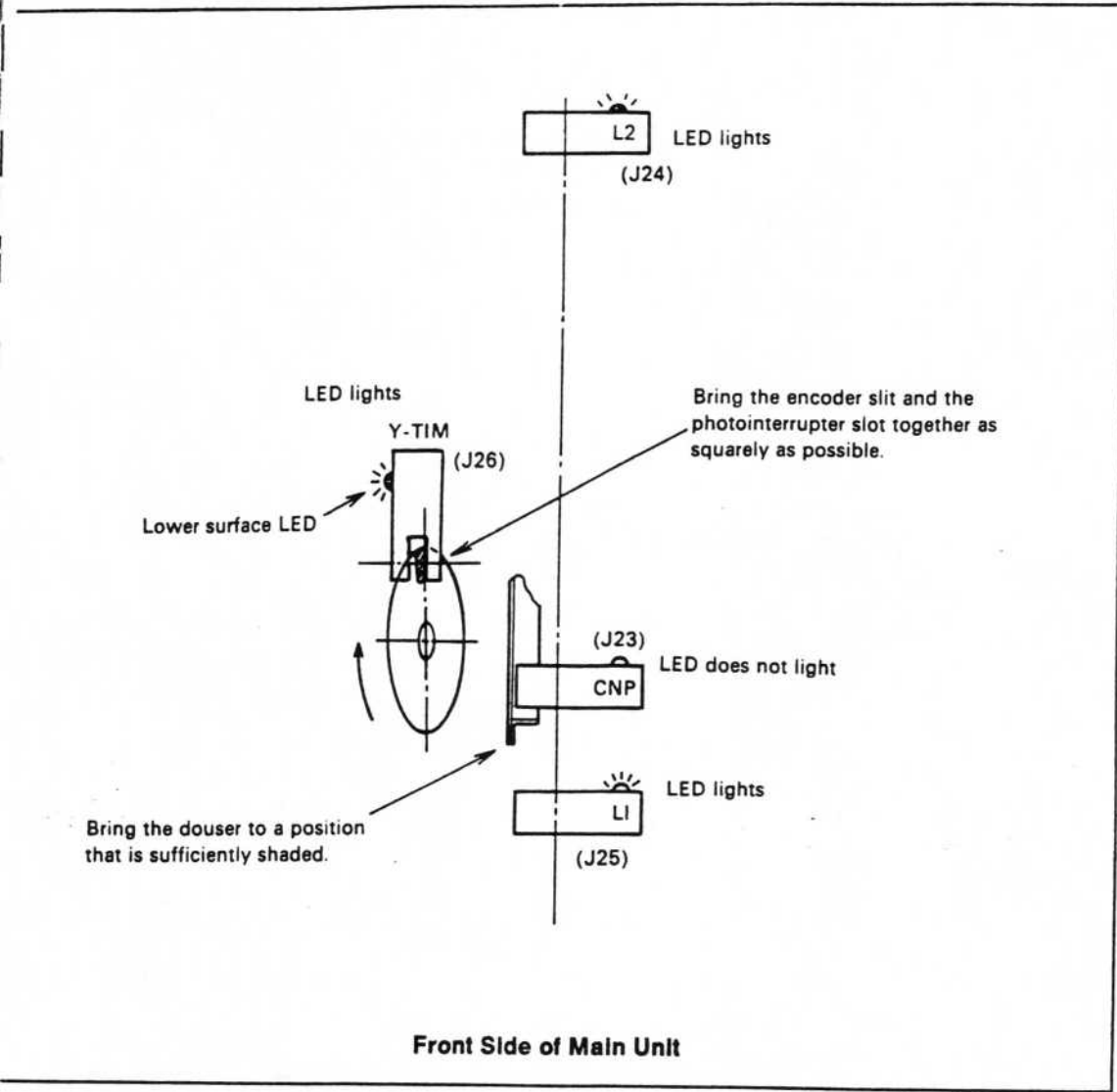
- 1) This should be done following adjustment of the electricity flow in the electrical section.
- 2) Connect the computer, display, and main unit with the two interface cables.
- 3) There should be no optional units attached to the main unit. (At any rate, there should be none attached to the front of the main unit.)
- 4) Insert the Home position gauge in the location pin hole of the base plate, which is found at the front left side of the main unit.
- 5) Turn on the power to the main unit, computer, and display.
- 6) Insert the system disk in Drive 1 and the data disk in Drive 2, and press the reset button.
- 7) The Main Menu is displayed on the screen. Type in **[2]** and then **[RETURN]**. This selects "2. Mount Data Input".
- 8) Press **[f.2]** to select TEACHING/B mode.
- 9) Press the HOME key on the main unit. The X and Y axes move, and stop at the Home Position.
- 10) Press the O/P HEAD key on the main unit, and check that the bit enters the center hole in the Home position gauge. If it doesn't, perform adjustments according to items 13) to 16).



11) At the position leaving the Home position, the photointerrupter of the X axis must appear as shown below. If it doesn't, it must be adjusted according to items 13) to 16).

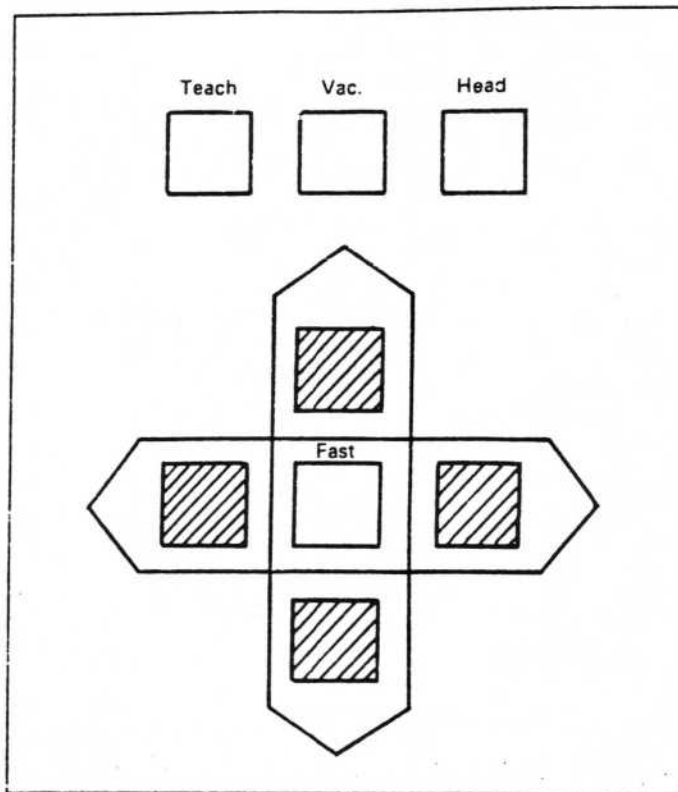


12) At the position leaving the Home Position, the photointerrupter of the Y axis must appear as shown below. If it doesn't, it must be adjusted according to items 13) to 16).

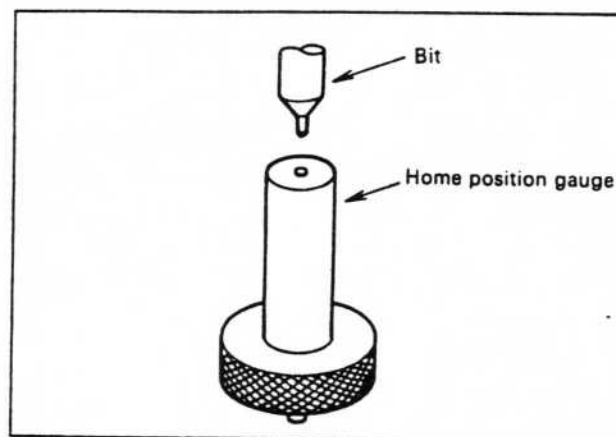


\* indicates that if items 10) to 12) are not operating correctly, should be implemented.

- 13)\* On the main unit operation panel (O/P), use the keys pictured below to operate the X and Y axes, estimating visually the center of the Home Position to move the head there. (TEACHING/B mode)



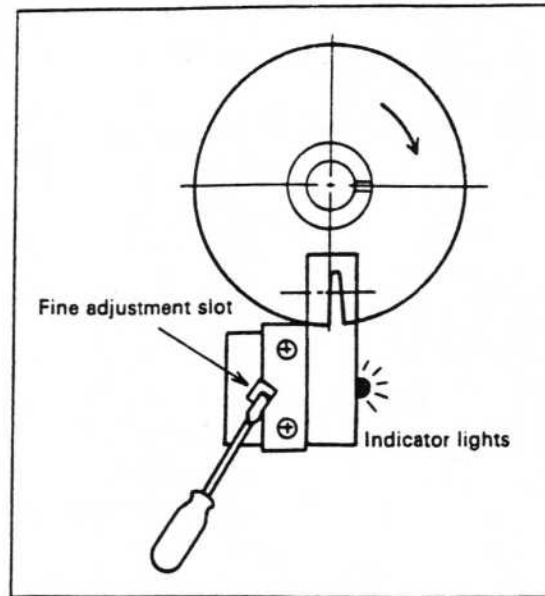
- 14)\* Press the HEAD switch on the O/P to lower the bit, and check that the bit has entered the center hole in the Home position gauge. If its position is not correct, press the HEAD switch once more, so the bit is raised. Use the directional keys pictured above to adjust the position of the head until the bit drops into the startpoint hole when lowered with the HEAD switch.





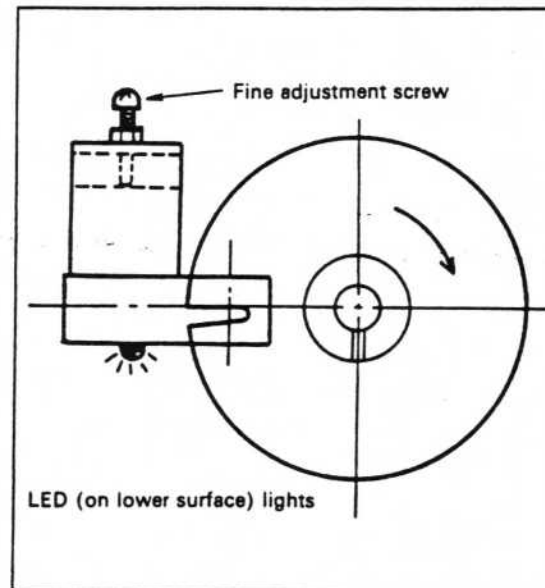
15) \* Adjust the X axis encoder in the following manner (while the motor is operating).

- (1) Loosen the encoder set screw, and bring the left edge of the encoder slit to the center of the photointerrupter, estimating the position visually. Tighten the encoder set screw.
- (2) For fine adjustment, loosen the bracket attaching the photointerrupter slightly, and align it with a screwdriver.
- (3) Place the slit of the encoder and the photointerrupter slot in as square as possible.



Adjust the Y encoder as follows (while the motor is operating).

- (1) Loosen the encoder set screw, and bring the upper edge of the encoder slit to the center of the photointerrupter, estimating the position visually. Tighten the encoder set screw.
- (2) For fine adjustment, use the fine adjustment screw on the bracket of the photointerrupter to move the entire bracket up and down. When it is positioned correctly, tighten the nut.
- (3) Place the slit of the encoder and the photointerrupter slot in as square as possible.



- 16) \* Press the HOME key again, and check items 10), 11) and 12).
- 17) Press [f.2], to cancel the TEACHING/B mode. Press the [7] key to return to the Main Menu.
- 18) Press [4] and then [RETURN] to select "4. Test".
- 19) The screen "I/O Test" is displayed. Press [3] and then [RETURN] to select "XY Movement".
- 20) Press [f.1] and check the HOME operation. The HOME position resumption operation is a function of hysteresis.
- 21) Press [f.1] once again to escape the HOME operation.
- 22) Press [f.2] implement movement of the X and Y axes along the four corners of the rectangle and the diagonal line. If there are irregularities, press the [ESC] key immediately to stop operation. Check that there is no noise or motor herniation, and that there is no oscillation in the timing belt.
- 23) Press the [7] key to stop movement of the X and Y axes and return to the Main Menu. Then take the disk out of the computer and turn off the power.

### **3. \_\_\_\_\_**

#### **REPLACING ELECTRICAL PARTS**

##### **1. Fuse Replacement**

When replacing fuses, be sure to use fuses with the same rating as the previous ones. Fuses with different rating may cause a short circuit or other damage.

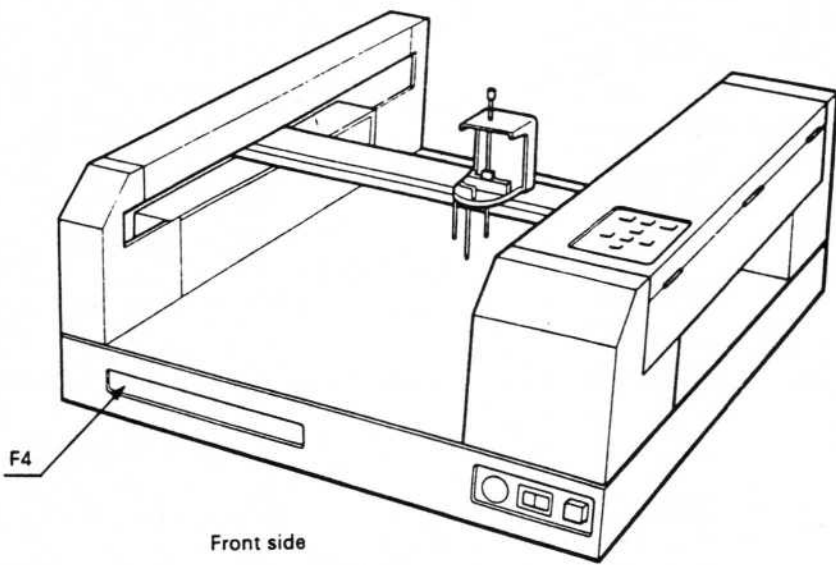
- (1) Replacing fuses in the main unit control box

**Table 1 Main Unit Fuse List**

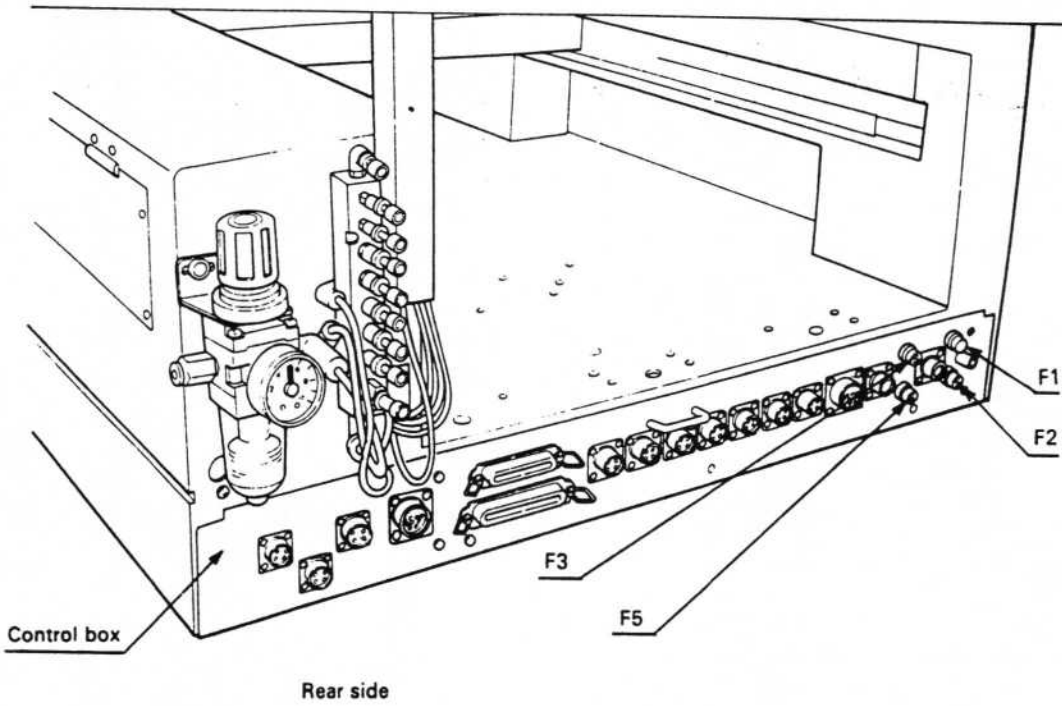
Location	Circuit Diagram Symbol	Standards
AC Input	F1, F2	125V 7A Slow Blow ø5.2 x 20 (F3 - F5 series)
Rear Panel Option	F3	125V 3A Slow Blow ø5.2 x 20 UL, CSA-authorized
Control Box Interior	F4	Same as above
Front Panel Option	F5	Same as above

##### **Replacement Procedure**

- 1) Turn off power to the main unit and disconnect the AC input cord.
- 2) Rotate the fuse cap and replace the fuse.



Front side



Rear side

Fig. 3 Main Unit Fuse Arrangement

(2) Replacing the transformer fuse

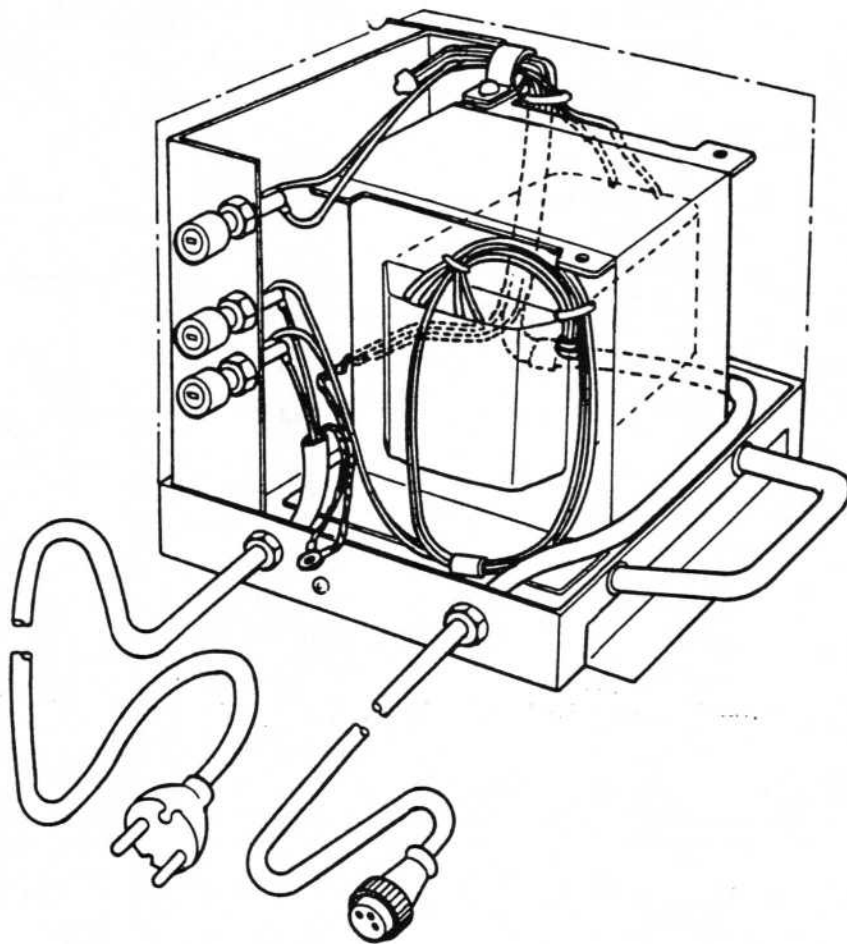
When using a power source transformer, use the following procedure to replace fuses.

- 1) Turn off power to the main unit.
- 2) Remove the power cord plug connected to the wall outlet from the transformer.
- 3) Take off the transformer cover.
- 4) Replace the fuse. Be careful not to lose the fuse carrier.
- 5) Replace the unit by following steps 3, 2, and 1 in that order.

**Table 2 Transformer Fuse List**

Location		Circuit Diagram Symbole	Standards
AC Input	110V	F1, F2	125V 10A Normal Blow ø5.2 x 32 UL, CSA-authorized
	120V		
	200V		250V 5A Time Lag ø8 5.2 x 20 SEMKO-authorized
	220V		
240V			
AC Output (100V)		F3	125V 10A Normal Flow ø6.4 x 32 UL, CSA-authorized

The fuse holder is an international type that has a carrier which corresponds to the fuse element. The transformer is equipped with an internal temperature fuse, but replacement should be done for each transformer.



**Fig. 4 Transformer Fuse Arrangement**

**(3) Replacing fuses in the efeeders and optional units**

**Replacement Procedure**

- 1) Turn off power to the main unit.
- 2) Turn off power to the feeders and optional units.
- 3) Rotate the fuse cap and replace the fuses.

Table 3 Fuse List for Feeders and Optional Units

Location	Standards
8/12 mm Tape Feeder	125V 1A Time Lag ø5.2 x 20 UL, CSA-authorized
Linear Feeder	Same as above
Assembly Board Conveyer	No fuse (protected by F4 in control box)
Rotary Table	No fuse (protected by DC 24V, DC 5V internal power supply fuse)
IC Stick Feeder	125V 1A Time Lag ø5.2 x 20 UL, CSA-authorized
(NOTES)	PCB Receptor, Lateral Magazine Receptor, IC Tray Receptor have no electricity flow

For the fuse attachment positions, please refer to the instructions for the individual feeders and optional units.

## 2. Replacing Parts in the Electrical Control Box

- 1) Turn off power to the main unit and disconnect the power cord from the AC input connector on the main unit rear panel. Also remove the I/F cable from the computer.
- 2) Remove all units from the rear side of the main unit.
- 3) Remove all connectors between the main unit control box and the front, left and right sides of the main unit, as well as the central section (automatic conveyer).
- 4) Remove the control box screws from the rear panel of the main unit (see Figure 5), and take off the control box. Place a block under the control box to balance it.

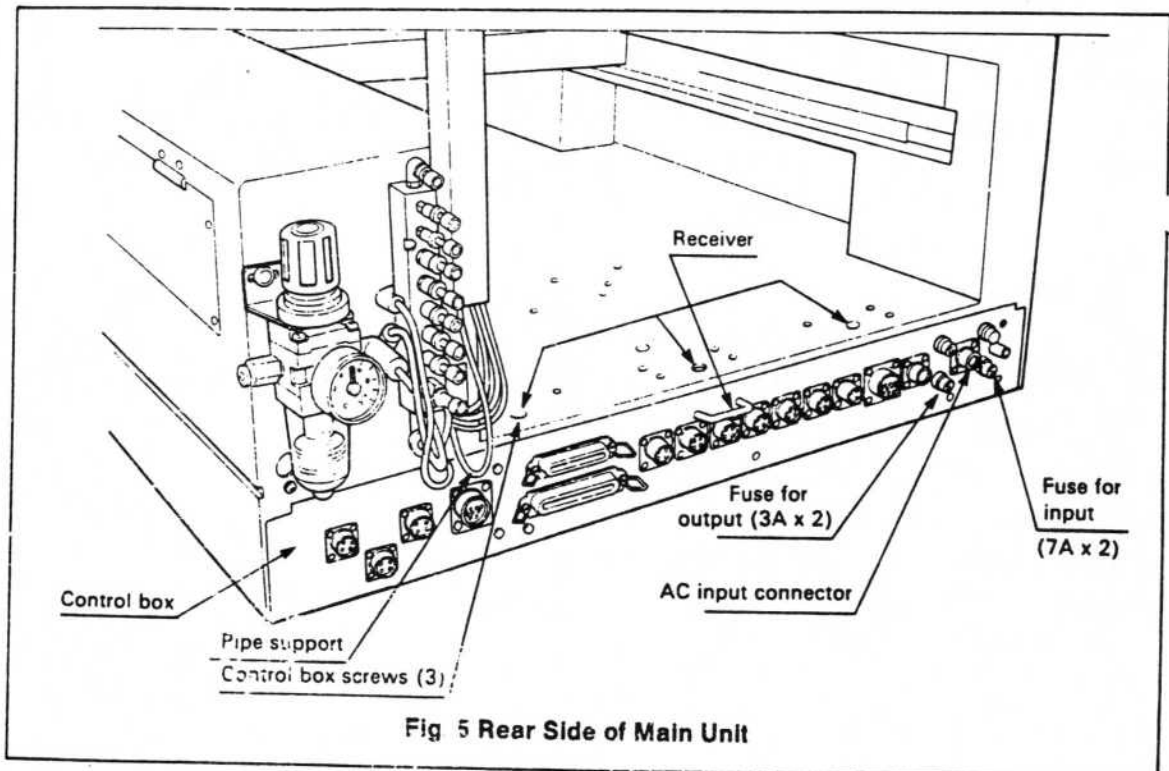


Fig 5 Rear Side of Main Unit

- 5) Push the air tube support upwards.
- 6) Slowly pull out the control box receiver.
- 7) The wiring inside the control box looks like Figure 6.
- 8) Remove the connectors, terminals, and screws of parts to be replaced.  
Be careful not to yank on connectors or pull them in a sideways direction. Pull the cord straight out so as not to damage the insertion and reception sections in the connector housing.
- 9) There are soldered sections inside the wiring ducts. When introducing new parts, be sure the soldered sections are covered securely with plastic tape and electrically insulated in insulation tubes.
- 10) After replacing parts, replace the connectors in the same locations from which they were disconnected.

**Note:**

- 1) After replacement, be sure to perform a wiring check.  
Connector numbers are displayed on the connectors, and terminal numbers on the terminals. Be careful not to make any mistakes when re-inserting connectors. If receiving connectors and sending connectors are mixed up, or connected to incorrect terminals, or there is a mistake in soldering, these may cause breakdowns in the equipment.
- 2) Do not put attachment screws, washers, terminal connector screws, solder, metal fittings, or other conductive materials inside the control box. If something does accidentally fall into the box, remove it promptly.

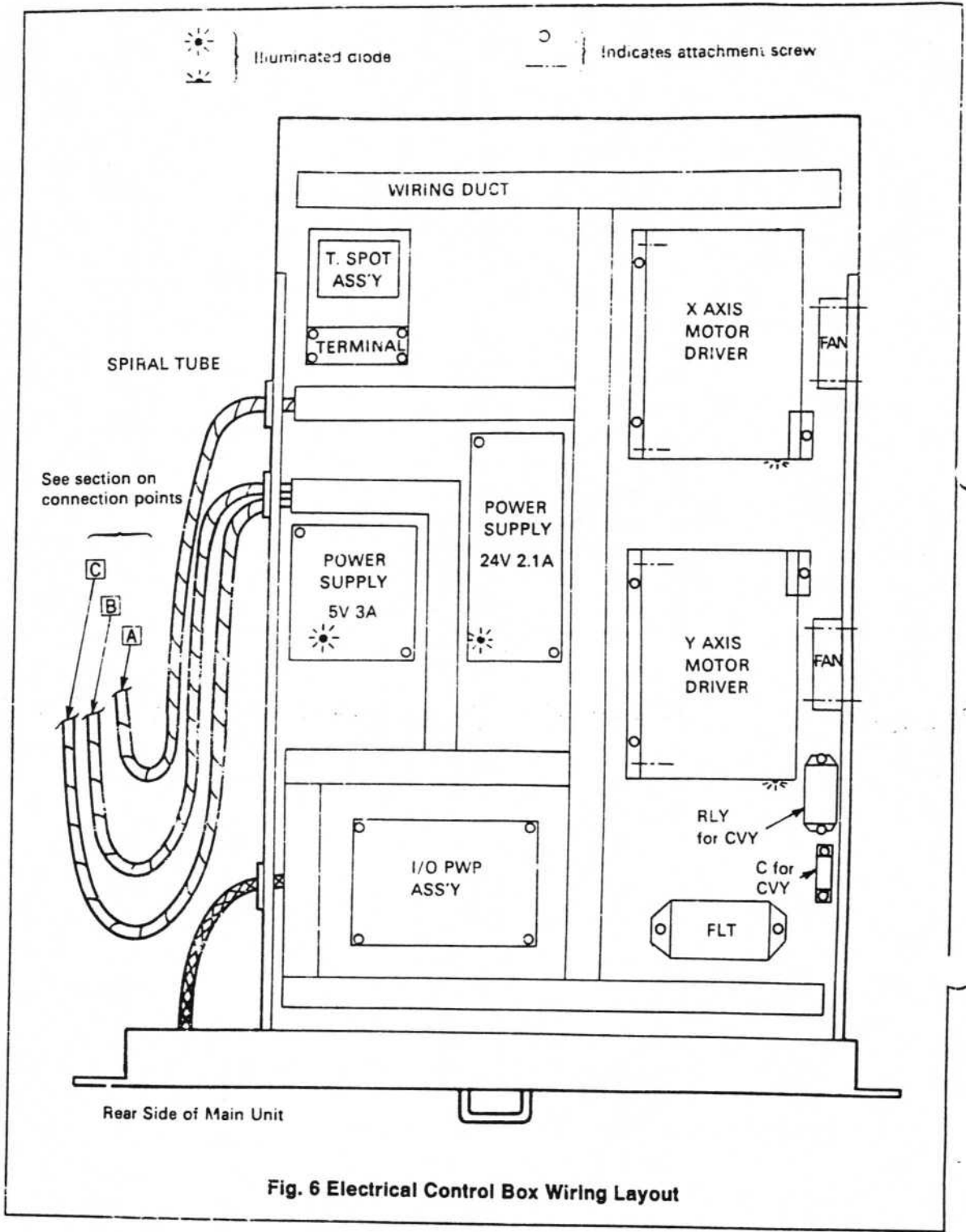


Fig. 6 Electrical Control Box Wiring Layout



## Control Box Connection Points

Table 4

Symbol	Connection Point
△ A	J60 AC SW J64 Y motor J66 X motor
△ B	J24 Y axis rear limiter (Y-L2) J70 Teaching spot (relay) J71 Electromagnetic valve J72 Pressure sensor, head down sensor (relay) } *1
△ C	J23 Y axis Home position vicinity switch (Y-CNP) J25 Y axis front limiter (Y-L1) J26 Y motor encoder sensor (Y-TiM)  J61 HOME switch J62 Operation panel J63 Y motor cooling fan J65 X axis sensor

\* 1 J70-72 are wired to the air regulator on the rear side. Other connection points are on the front side power switch panel.

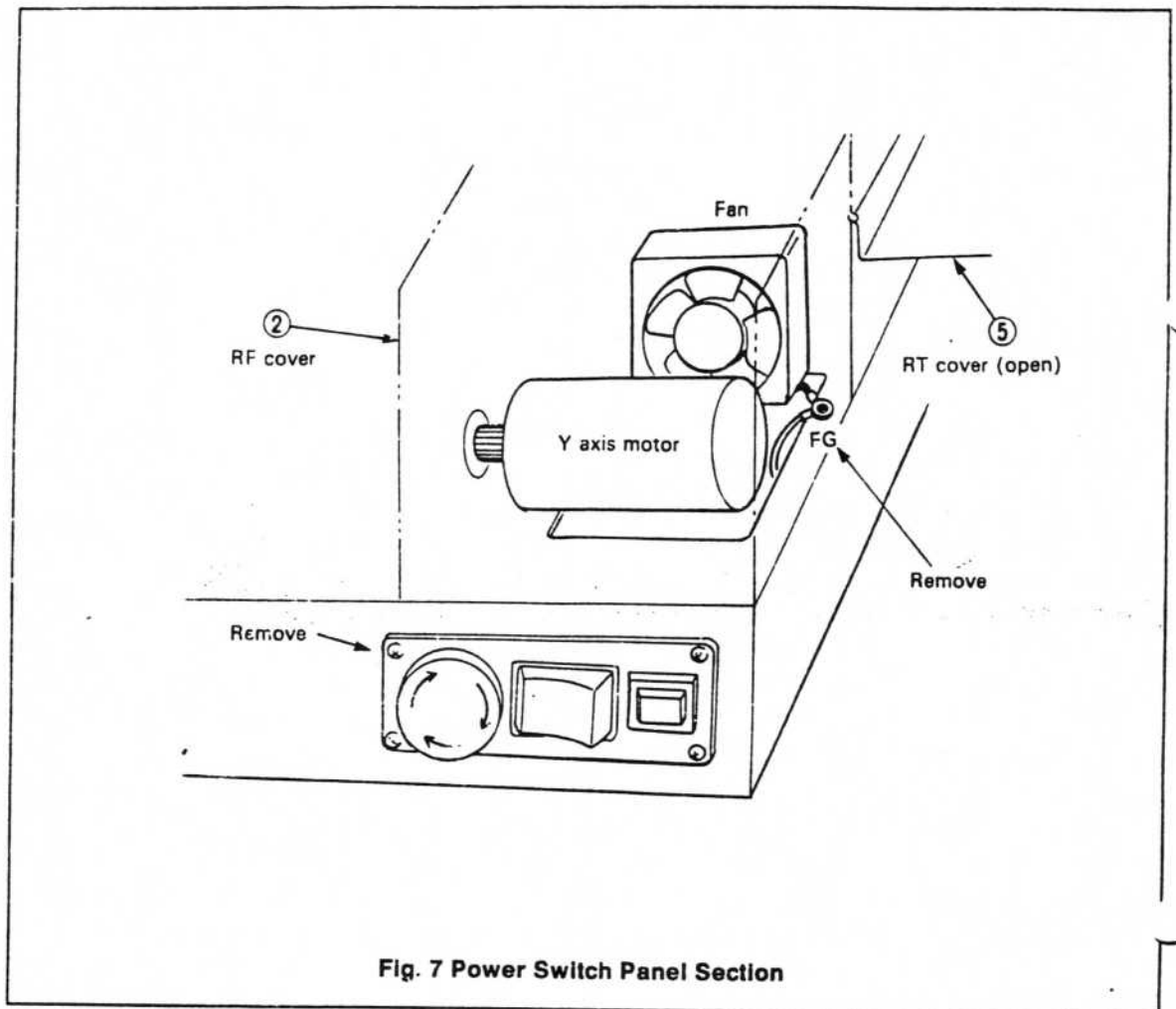
- 11) Check the flow of electricity while the optional units and feeders are still disconnected and the control box is still out. Perform the check as described in section 2 of "Electricity Flow Adjustment", "Electricity Flow Adjustment When No Options are Attached".
- 12) Perform the same kind of check according to section 3, "Electricity Flow Adjustment When Options are Attached".
- 13) Reverse the order of steps 1 to 5 to re-assemble the unit.

**Note:**

- 1) If the system doesn't boot, or if different trouble signs appear than before replacement, turn power off immediately and check the wiring at connection points where parts were replaced. Confirm that no conductive elements have entered the control box.
- 2) If no wiring irregularities are found, and there are no conductive elements in the control box, perform troubleshooting operations and any necessary repairs or adjustments. See the section on "Troubleshooting".
- 3) If the system boots but the same signs of trouble are displayed as before parts replacement, it is evident that the replaced parts were not the source of the trouble. Replace the original parts and search further for the cause of the problem.

### 3. Replacing Parts in the Power Switch Panel (See Figure 8.)

- 1) Turn off power to the main unit, and remove the connector of the AC input cord.
- 2) Remove the attachment screws on the power switch panel, at the lower right side of the main unit front panel. Gently pull the power switch panel away from the main unit.
- 3) Remove the screws of the RT cover ⑤ and open the RT cover all the way to the right.
- 4) Inside the RF cover ② is a terminal marked FG (Frame Ground). Remove this terminal (see Figure 7.) Be careful not to drop the screws into the main unit basebox.



## Names of Main Unit Parts

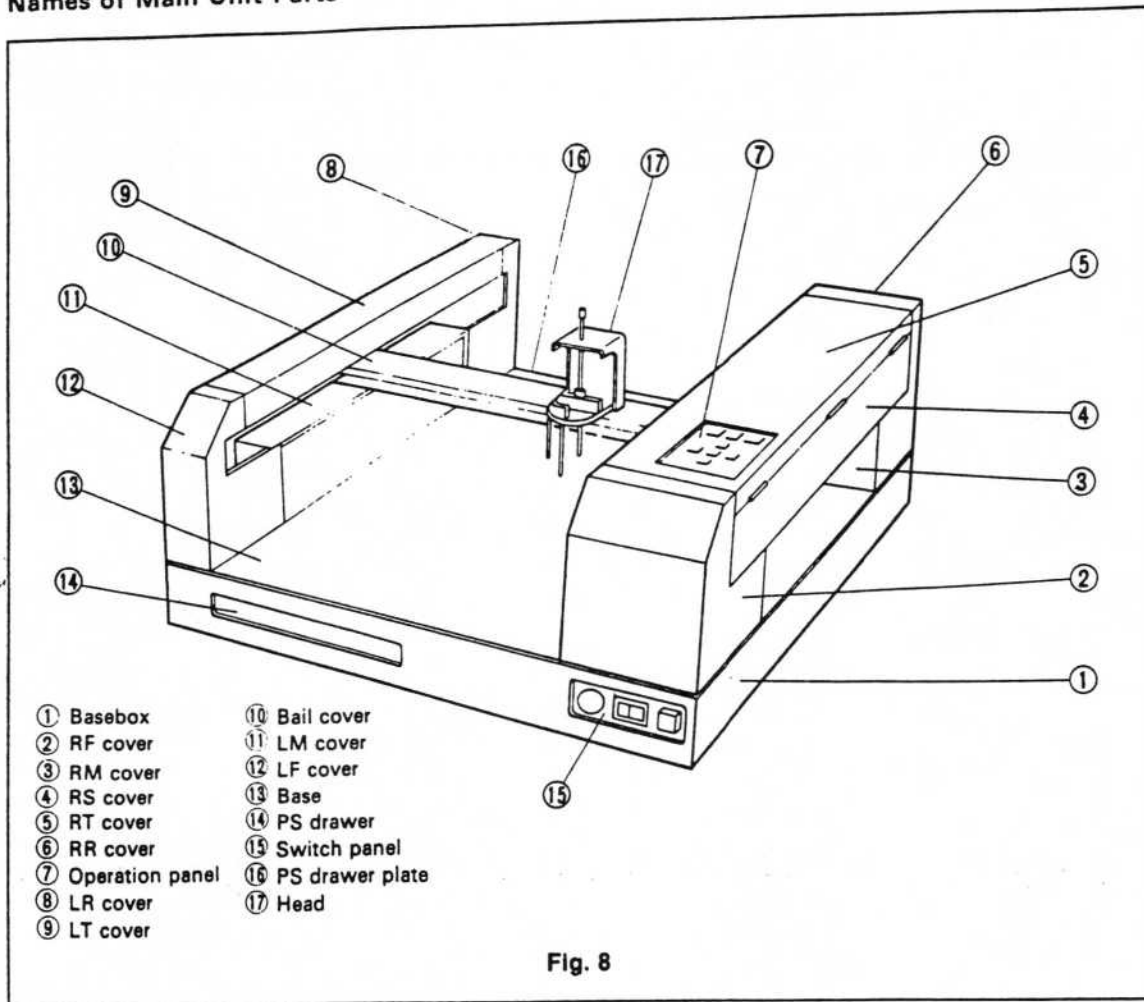
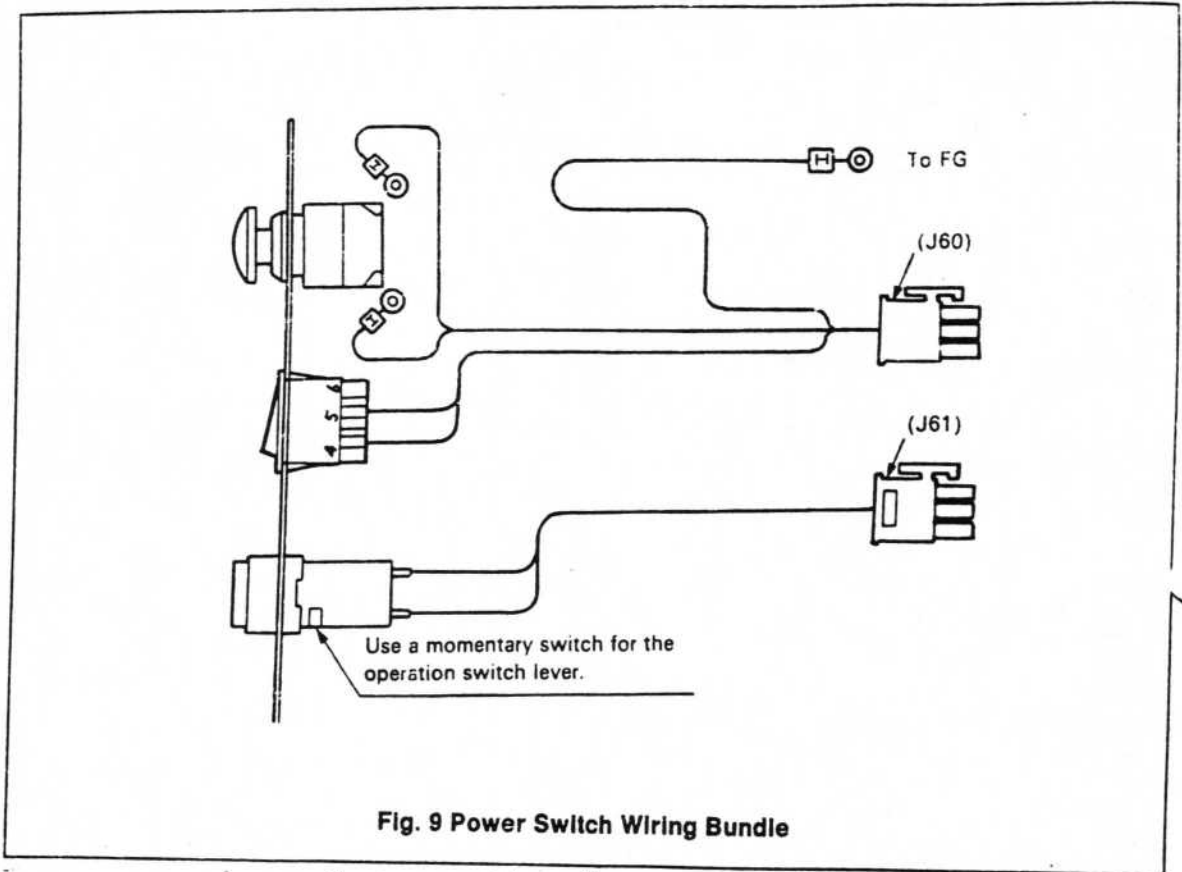


Fig. 8

- 5) Slide your hand between the power switch panel and the basebox ① of the main unit, and carefully draw out the bundle of wires inside.
  - 6) If you remove the connectors, the bundle of power switch wires can be drawn out. (See Figure 9.)
  - 7) Remove the wiring of the parts to be replaced with a soldering iron or screwdriver.
  - 8) Attach the new parts using the soldering iron or screwdriver.
- \* Be sure to insulate parts using solder with a heat-contracting tube, as the previous parts were.
  - \* Connect the terminals of the new parts to the same connection points as the old parts.
  - \* When replacing the HOME key, specify the same operation switch lever as before replacement. Use a momentary switch.



**Fig. 9 Power Switch Wiring Bundle**

#### 4. Replacing the Operation Panel Assembly Board Set (See Figures 8, 10 and 11.)

- 1) Turn off the main unit power switch and remove the connector of the AC input cord.
- 2) Remove the screws of the RT cover ⑤ . Open the RT cover.

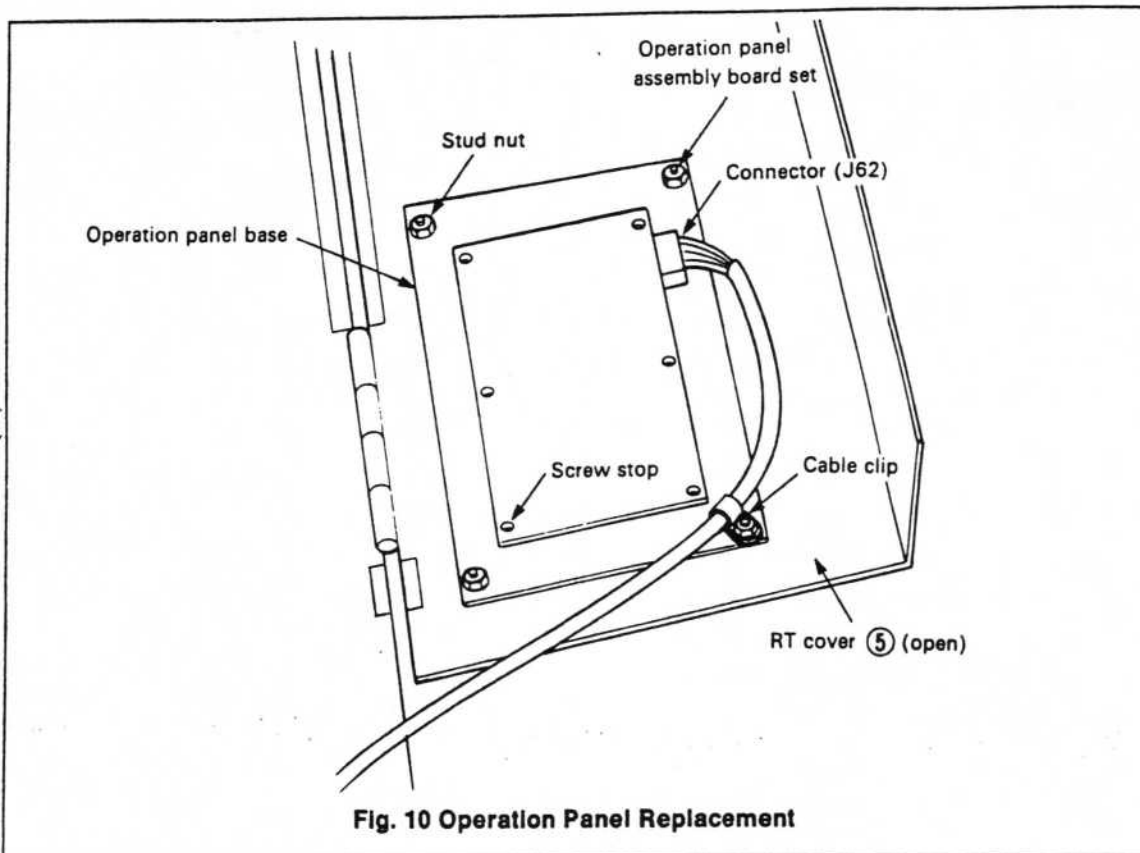
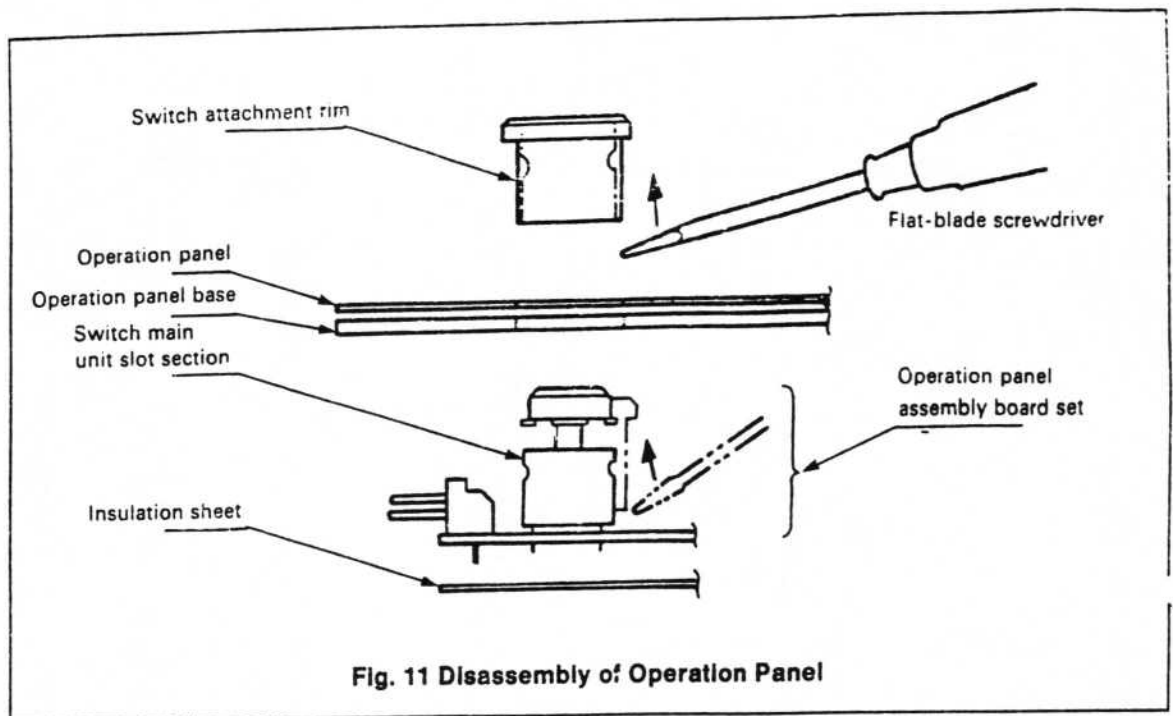


Fig. 10 Operation Panel Replacement

- 3) Remove connector J62 and the cable clip.
- 4) Remove the operation panel base.
- 5) With a flat-blade screwdriver, remove the switch attachment rims of all the switches. Remove the rims in the switch main unit order, with the tip of the screwdriver, so as not to damage the rims.
- 6) Remove the attachment screws of the operation panel assembly board set and substitute the new set.
- 7) Add an insulation sheet and attach the new assembly board set to the operation panel base (leave it a little loose temporarily).



**Fig. 11 Disassembly of Operation Panel**

- 8) Press the switch attachment rim from the operation panel hole to the switch main unit. It is easiest to do this using the Fast key and Vacuum key. When inserting the rims, be careful not to mistake the alignment of the rim notch and the switch main unit slot.
- 9) When rims have been inserted in all keys, tighten the assembly board set on the operation panel base.
- 10) Attach the RT cover to the operation panel base.
- 11) Insert connector J62, and fasten the cable clip.
- 12) Close the RT cover and secure it with screws.

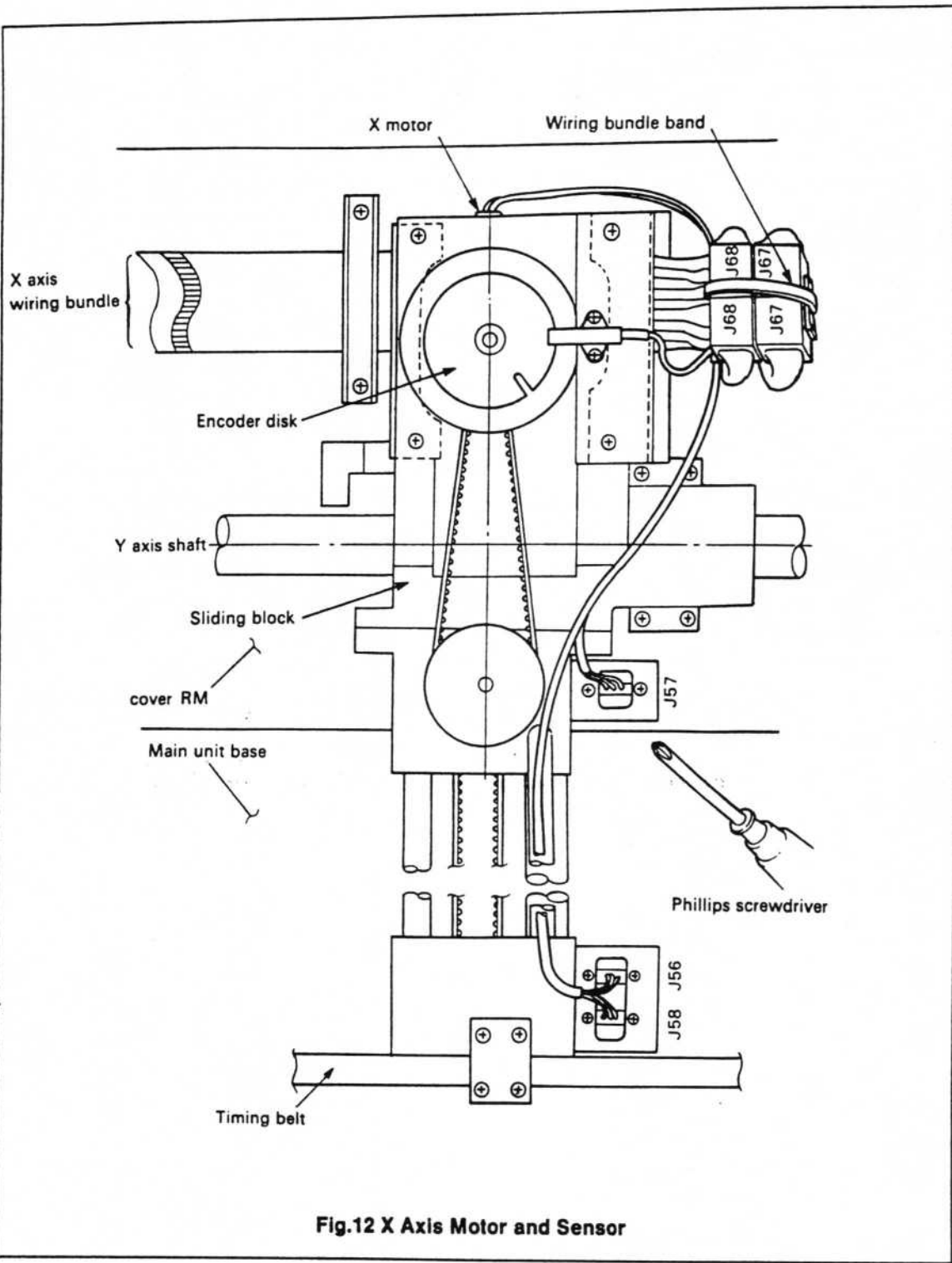
## 5. Replacing the X Axis Sensor and Motor (See Figures 8 and 12.)

Turn off power to the main unit, and follow the steps below.

- 1) Remove the screws holding the RT cover ⑤ in place, and open the cover all the way.
- 2) Remove the RS cover ④. The RS cover and RT cover can be removed still attached to the hinge sections.
- 3) Remove the RF cover ⑤.
- 4) Remove the bail cover ⑩.

### Replacing the X Axis Limiter and Home Position Vicinity Sensor

- 5) Take out the wiring connectors of the Home Position vicinity sensor J56, the X axis limiters J58 and J57, and the X axis encoder sensor J59.
- 6) Remove the screws holding J56-58 in place, on the underside. The screw for J59 is on the upper side.
- 7) Attach the new sensor and stamp the connector marker from the old sensor onto it.
- 8) Insert the wiring connectors.



**Fig.12 X Axis Motor and Sensor**

## X Motor Replacement

- 9) Cut the band holding connectors J67 and J69. Remove connector J68 without causing damage to the flat cable.
- 10) Remove the X axis motor encoder sensor J59.
- 11) Remove the encoder disk.
- 12) Remove the screws holding the X motor to the sliding block.
- 13) Replace the X axis motor set.
- 14) Repeat steps 9) through 12) in reverse order.

**Note:**

After replacing parts, adjust the Home Position by following the instructions in "XY Home Position Adjustment". Then reverse the replacement procedure to return to the original operation. Be careful not to drop screws, washers, etc. into the main unit basebox.

## Replacing the Wiring Bundle of the X Axis (See Figures 8 and 13.)

- 1) Remove the screws holding the RT cover ⑤ in place.
- 2) Remove the screws holding the RS cover ④ in place. Remove both of the covers.
- 3) Remove the screws holding the RF cover ② in place, and take off the cover.
- 4) Replace the bundle of wiring for the X axis shown in Figure 13 as described in the instructions.

As preventive maintenance, when replacing the flexible flat cable, also replace the two stainless steel plates at the same time.



(Note 1) Pay attention to the direction in which the stainless plate is folded. In order not to damage the cable, make sure the folded edge of the cable is directed outwards.

(Note 3) The bracket cable runs between the inner and outer stainless plates. Make sure it doesn't protrude from between the plates.

The W symbol indicates that some space should be left between the brackets.

The connectors and remaining lengths of wiring should be bound together with a wiring bundle band.

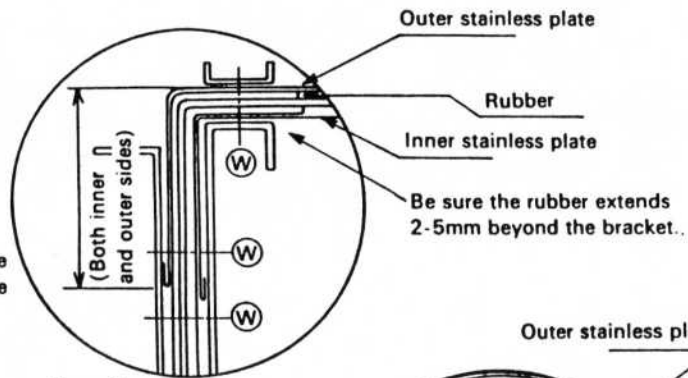
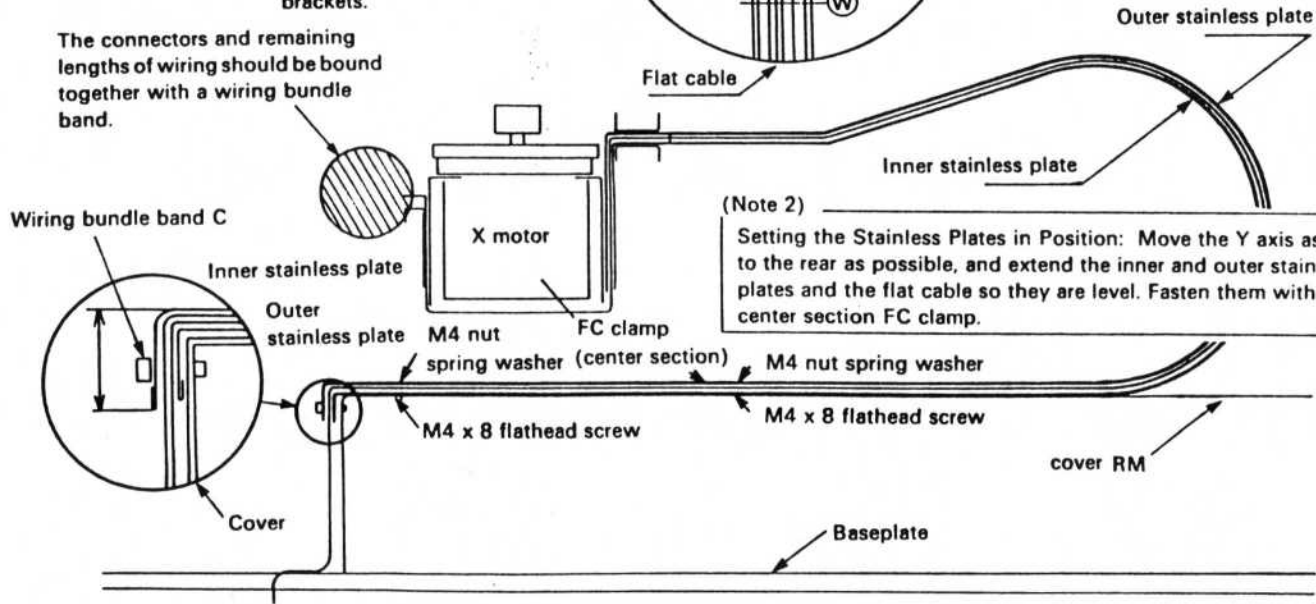


Fig. 13



(Note 2) Setting the Stainless Plates in Position: Move the Y axis as far to the rear as possible, and extend the inner and outer stainless plates and the flat cable so they are level. Fasten them with the center section FC clamp.

## 6. Replacing the Y Axis Sensor and Motor (See Figures 8 and 14.)

Turn off power to the main unit, and perform replacement according to the following procedure.

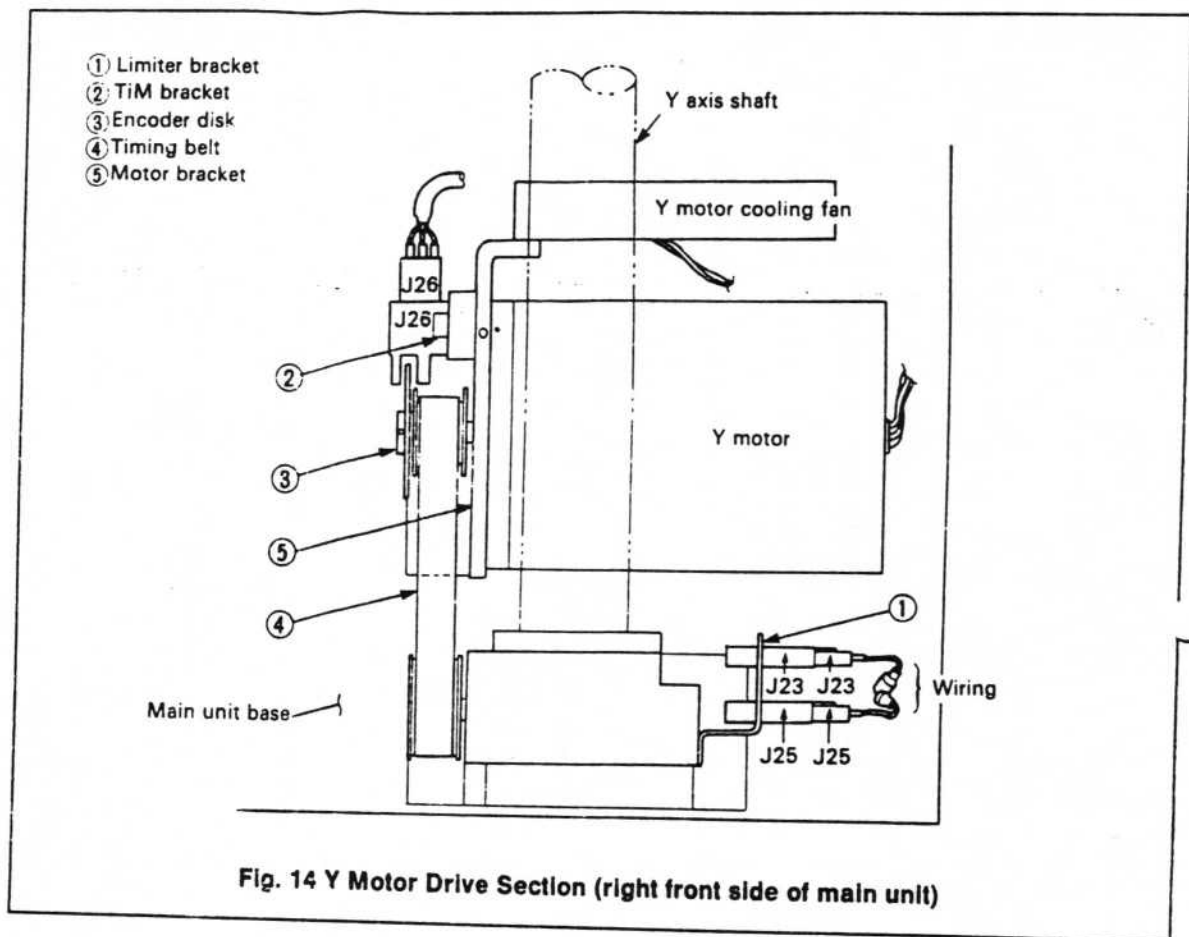
- 1) Remove the screws of the RT cover (5), and open the cover all the way.
- 2) Take off the RF cover (2).

Replacing the Y Axis Front Limiter (J25) and Y Axis Home Position Vicinity Switch (J23)

- 3) Draw out connectors J23 and J25 on the wiring side.
- 4) Remove the screws of the photosensors (J23, J25) fastened to the limiter bracket (1).
- 5) Attach the new photosensors to the limiter bracket (1).
- 6) Transfer the connector markers from the old sensors to the new ones.

Replacing the Y Motor Encoder Sensor (J26)

- 7) Pull out connector J26 from the wiring side.
- 8) Remove the screws from the photosensor (J26) attached to the TiM bracket (2).
- 9) Attach the new photosensor to the TiM bracket.
- 10) Transfer the connector markers from the old sensor to the new one.



### Replacing the Y Motor and Y Motor Cooling Fan

- 11) Remove the power switch panel (see Figure 7).
- 12) From the opening between the power switch panel and the main unit base box, slowly draw out the connectors J63 and J64 from the wiring.
- 13) Remove connectors J63 and J64.
- 14) Remove the Y motor encoder sensor (J26).
- 15) Remove the encoder disk ③.
- 16) Remove the motor bracket ⑤.
- 17) Remove the timing belt ④.
- 18) Remove the Y motor, Y motor cooling fan, and motor bracket ⑤ units from the main unit base.
- 19) Remove the Y motor and Y motor cooling fan from the motor bracket ⑤ and replace them.

For replacement of the Y axis rear limiter (J24), see "Replacing the Electromagnetic Valve".

**Note:**

After replacing parts, perform adjustment of the Home Position, following the procedure outlined in "XY Axes Home Position Adjustment". Then reverse the replacement procedure to return to the original operation. Be careful not to let screws, washers, etc., drop into the main unit basebox.

## 7. Replacing the Electromagnetic Valve (See Figures 8 and 15.)

Turn off power to the main unit and set the air pressure to zero with the regulator. Perform replacement using the following procedure.

- 1) Remove the screws holding the RT cover (5) in place.
- 2) Remove the screws holding the RS cover (4) in place, and remove the RT cover (5) while it is still attached to the hinge section.

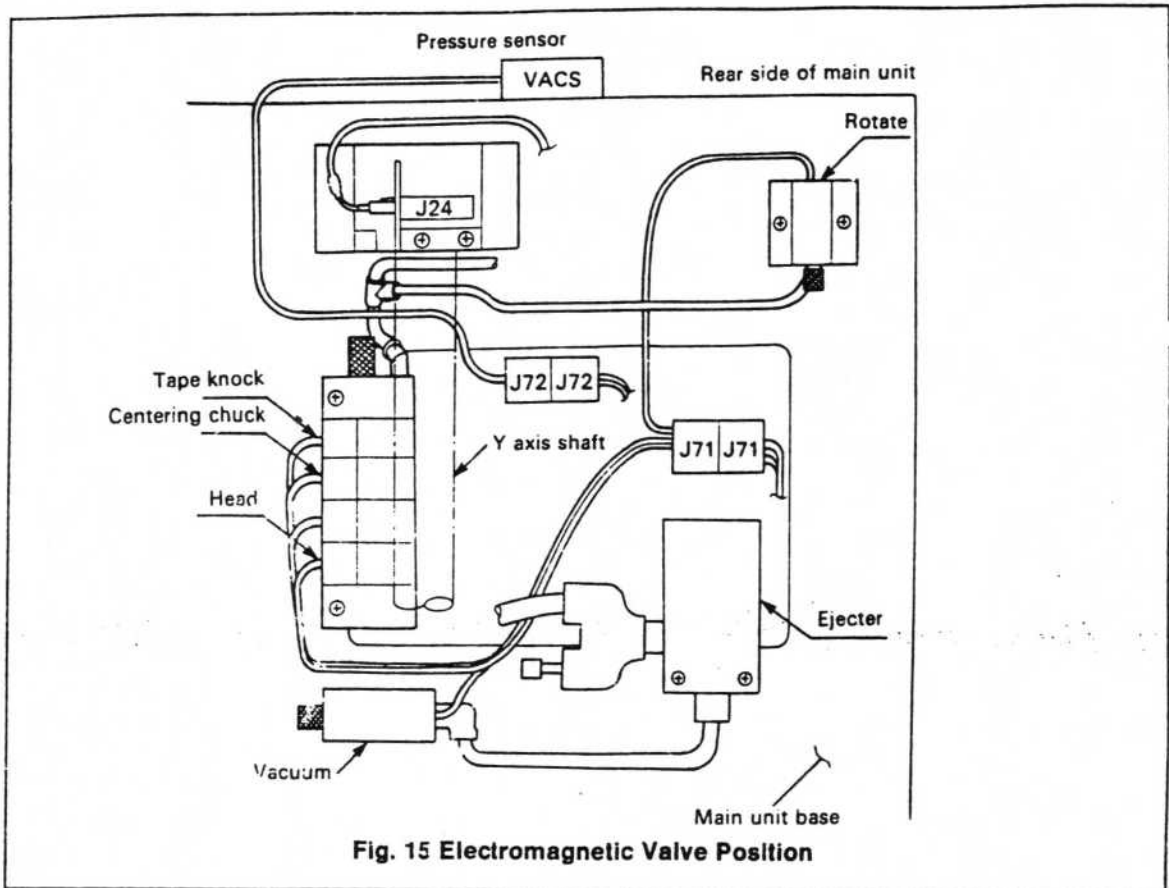


Fig. 15 Electromagnetic Valve Position

### Replacing the Pressure Sensor

- 3) Cut the wire on the inner side of the RR cover (6) that attaches the RR cover to the VACS (Vacuum Sensor).
- 4) Remove the VACS from the RR cover, and attach the new VACS.
- 5) Pass the lead through the wiring hole in the RR cover, and cut the lead at a length that will make it easy to reattach the section cut in item (3).
- 6) Solder the VACS lead with an insulated coating in the same way that the previous connection line was treated. Cover it with an insulated tube or bind it with insulated tape to make sure it is fully insulated (handling insulation).

## Replacing the Electromagnetic Valve

- 7) Perform the following on the inside of the RR cover ⑥:
  - 1) Remove all pipes attached to the air manifold. The pipes should be marked at this time so there will be no chance of error when replacing them.
  - 2) Disconnect the leadwire of the electromagnetic valve from connectors J71 and J72 slowly and carefully, to avoid damage.
- 8) Remove the RR cover. Leave the air regulator, manifold, and all other items attached to the cover. When you are not replacing the pressure sensor, move the RR cover so it is within range of the pressure sensor leadwire.
- 9) Remove the electromagnetic valve to be replaced from the main unit base.
- 10) Remove the air tubes connected to the valve to be replaced.
- 11) If the valve is connected to the manifold, disconnect it.
- 12) Cut the leadwire of the electromagnetic valve to a length that will be easy to connect.
- 13) Solder the leadwire with the same material used for insulation on the previous wire, to make sure it is securely insulated.
- 14) Reverse the replacement procedure to return to the original operation.

## 8. Replacing the Teaching Spot (See Figures 8, 16, 17, and 18.)

- 1) Remove the screws for the teaching spot holder on the teaching spot bracket.
- 2) Lift the teaching spot straight up. If the fit is tight, open the bracket section slot with a flat-bladed screwdriver.
- 3) (When changing the indicator lamp)  
Remove the set screws holding the teaching spot indicator lamp holder, and pull out the lamp holder.
- 4) Replace the lamp. It will be hot, so be careful.
- 5) (When replacing the teaching spot) Remove the unifying band (repeat tie), or, if the wiring is bound together in a bundle, undo the spiral wrapping. Wipe off connector J69.
- 6) Replace the wiring bundle of the teaching spot and repeat steps 5, 2, and 1, in that order.
- 7) Re-adjust the focus of the teaching spot. (See figure or the instructions in the head section.)

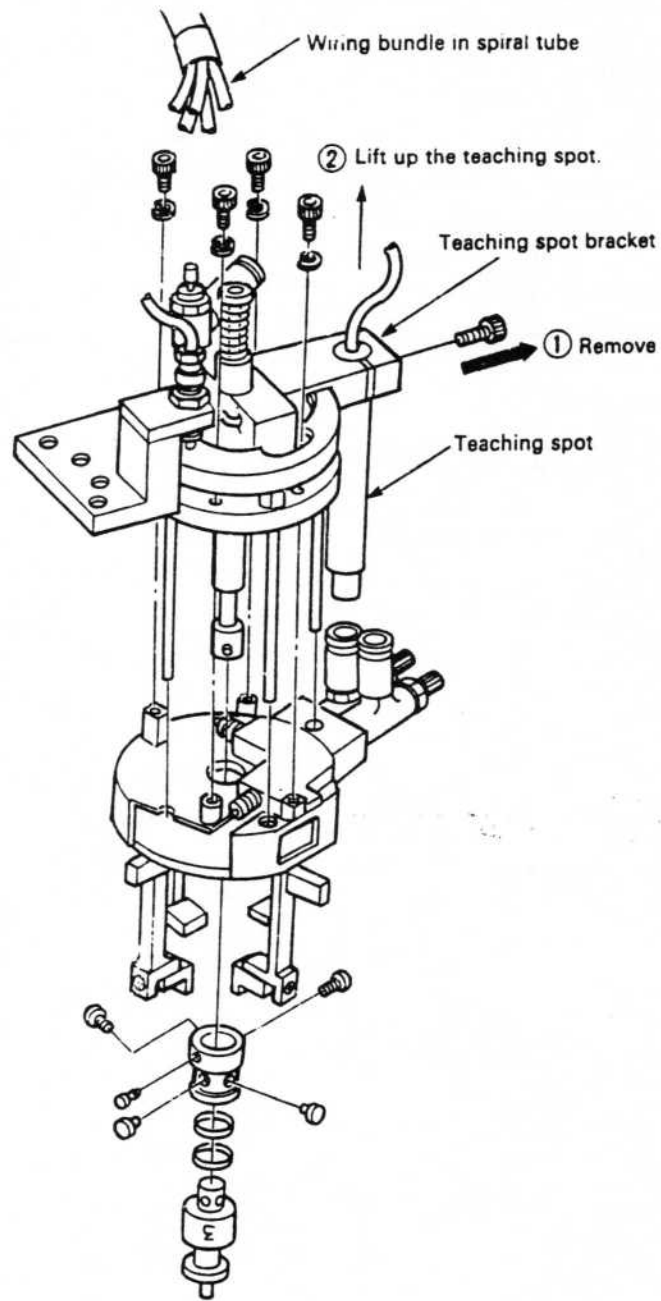
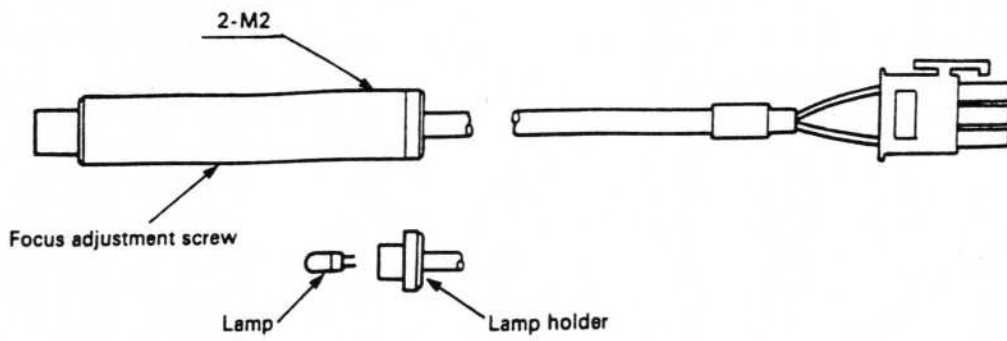
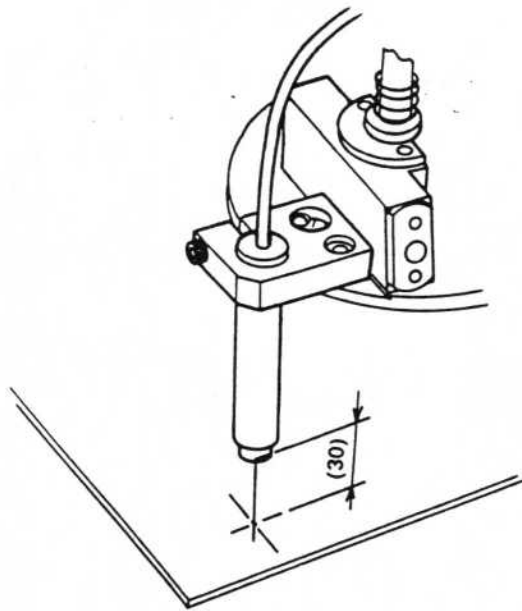


Fig. 16 Removing the Teaching Spot



**Fig. 17 The Wiring Bundle of the Teaching Spot and Replacement of the lamp**



**Fig. 18 Teaching Spot Focus Adjustment**

# HEAD UNIT

Section

# 2

1.

## REPLACING HEAD

### Head exterior

The head can be divided into 2 main sections; the head unit and the chuck unit.

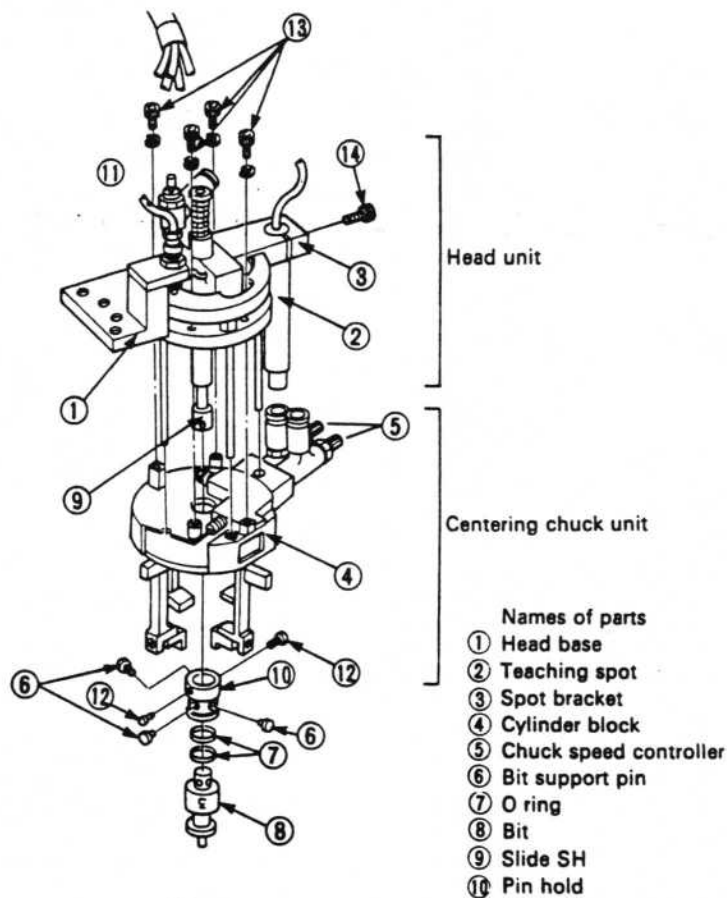
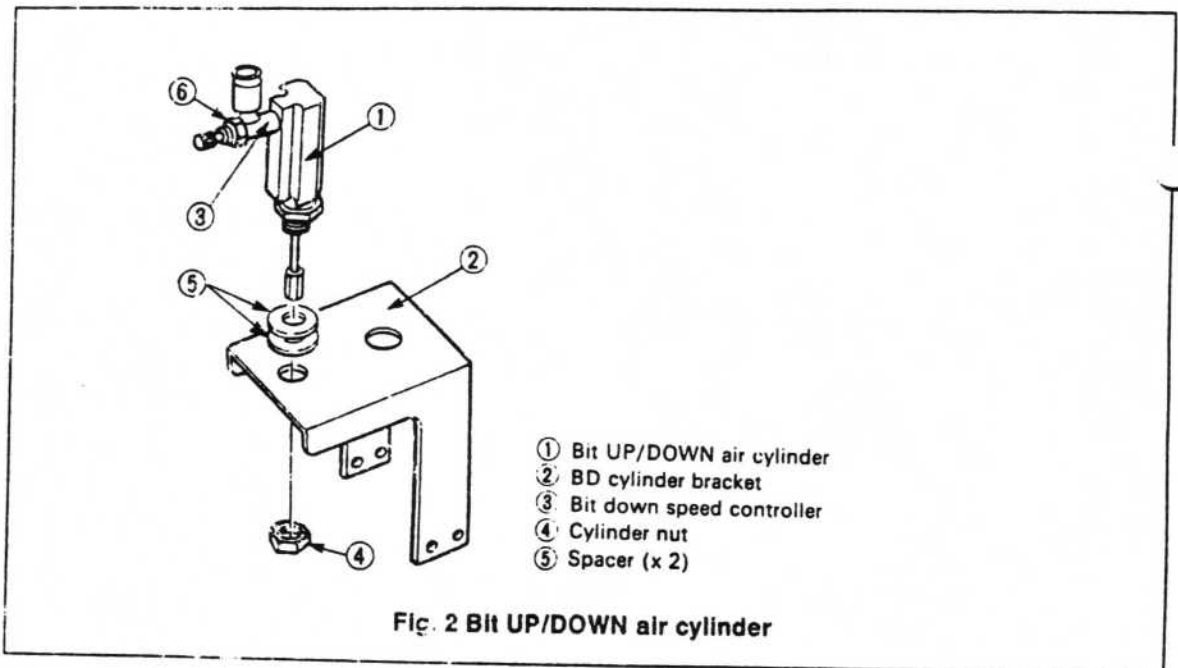


Fig. 1



- 1 Removal of the head from the main unit and its replacement (see Fig. 1).
  - (1) Remove all the polyurethane tubes attached to the head.
  - (2) Remove the assembly screws ( ⑪ , x 2) holding the head base ① to the main unit.
  - (3) Push down the slide SH ⑨ from the upper attachment section of the spring, raise the head base ① from the parallel pins (x 2) on the main unit side, and remove.
    - \* Assemble in the reverse order of (1) - (3).
  
2. Disassembly of the head unit and centering chuck unit (see Fig. 1).
  - (1) Pull out the bit ⑧ from below while turning (either clockwise or counterclockwise).
  - (2) Remove the O rings (x 2) attached to the pin hold ⑩ . Remove also the bit support pins ( ⑥ , x 3).
  - (3) Remove the screws ( ⑫ , x 2) from the pin hold ⑩ and remove the pin hold from the slide SH ⑨ .
  - (4) Remove the screws ( ⑬ , x 4) holding the head base ① and chuck unit, and remove the chuck unit from the head unit.
    - \* Assemble in the reverse order of (1)-(4). Adjustment is normally required on assembly (see Adjustment Manual).
  
3. Replacement of the teaching spot (See Fig. 1).
 

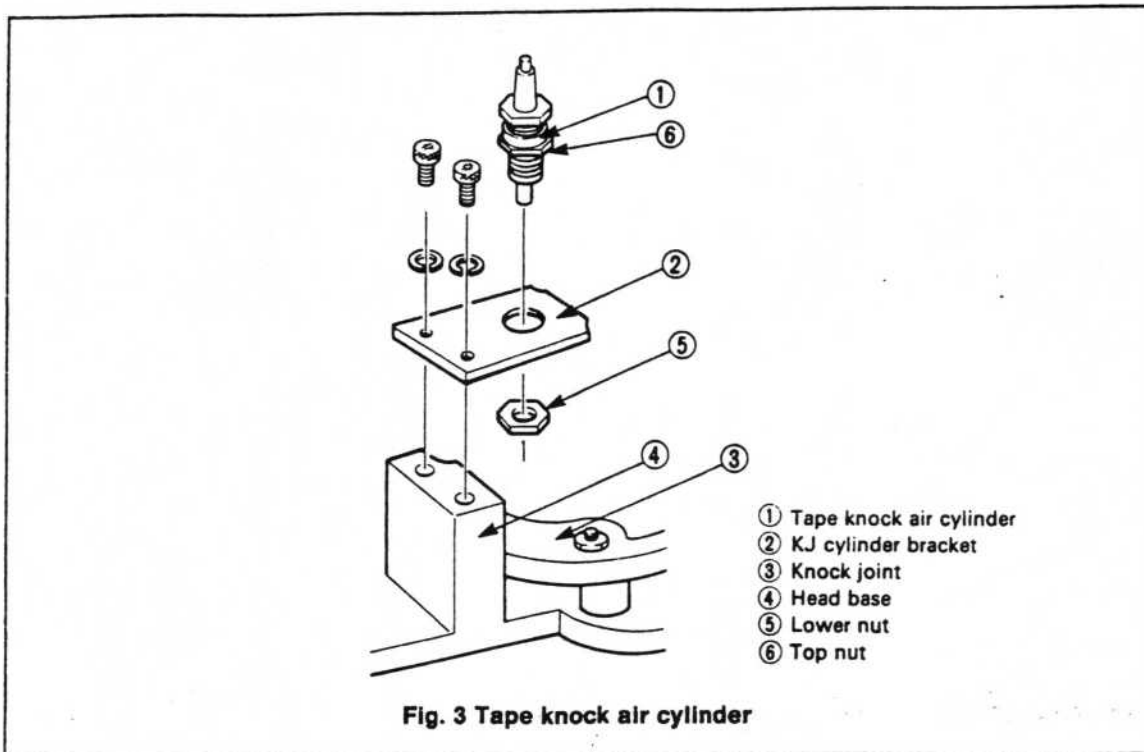
Loosen the screw ⑭ holding the teaching spot ② to the spot bracket ③, and remove the teaching spot from the top.
  
4. Replacement of the bit UP/DOWN air cylinder (see Fig. 2).
  - (1) Remove the nut ⑤ holding the bit UP/DOWN air cylinder ① to the BD cylinder bracket ② from the underside of the bracket.
  - (2) Loosen the nut ⑥ attached to the bit down speed controller ③ and take off the speed controller.
  - (3) Loosen the cylinder nut ④ and remove the cylinder.
    - \* Assembly is carried out in the reverse order of (1) - (3) above.



5. Replacement of the tape knock air cylinder (see Fig. 3).

(1) Loosen the nut ⑤ holding the air cylinder ① to the KJ cylinder bracket ② from the underside of the bracket, and remove the air cylinder ①.

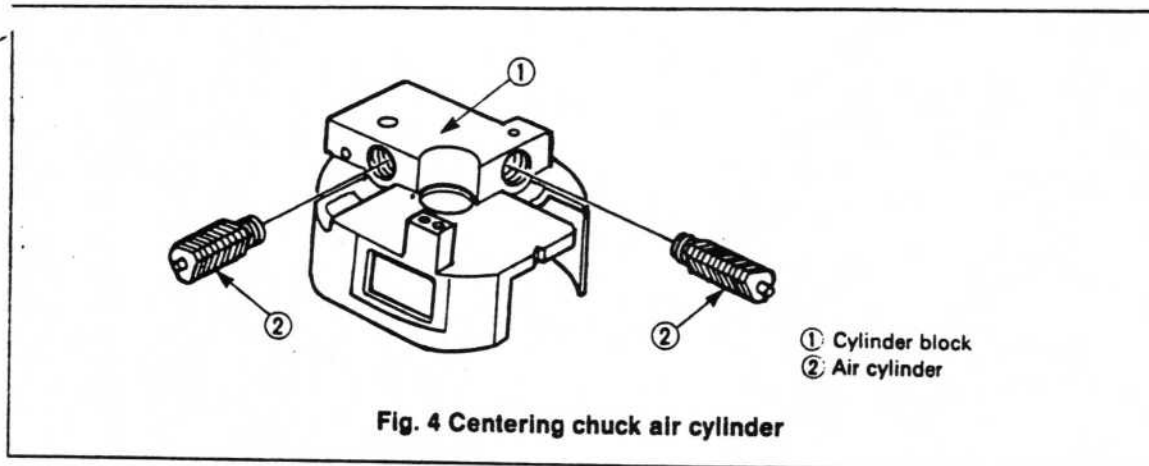
\* On assembly, adjust the top nut ⑥ so that the air cylinder end contacts the knock joint ③, and tighten the lower nut ⑤.



6. Replacement of the centering chuck air cylinder (see Fig. 4)

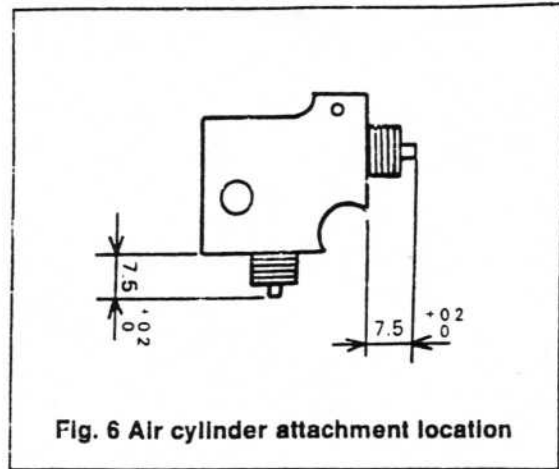
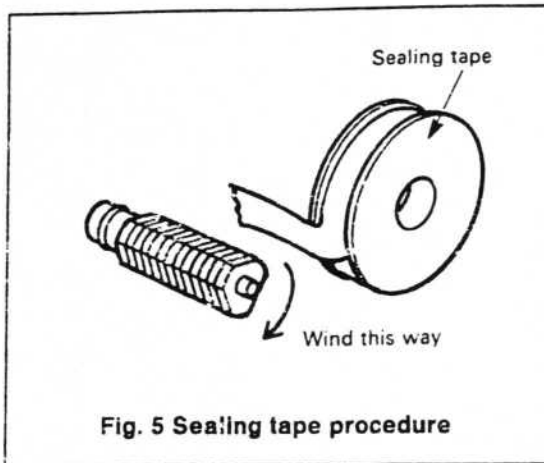
**Method of removal**

(1) Loosen the air cylinders ② screwed into the cylinder block ① with a wrench and remove them.



### Method of assembly

- (1) Wind sealing tape the around the threaded section of the air cylinder (see Fig. 5).
- (2) The amount of protrusion of each air cylinder from the screw holes in the cylinder block should be  $7.5 \pm 0.2$ (see Fig. 6)



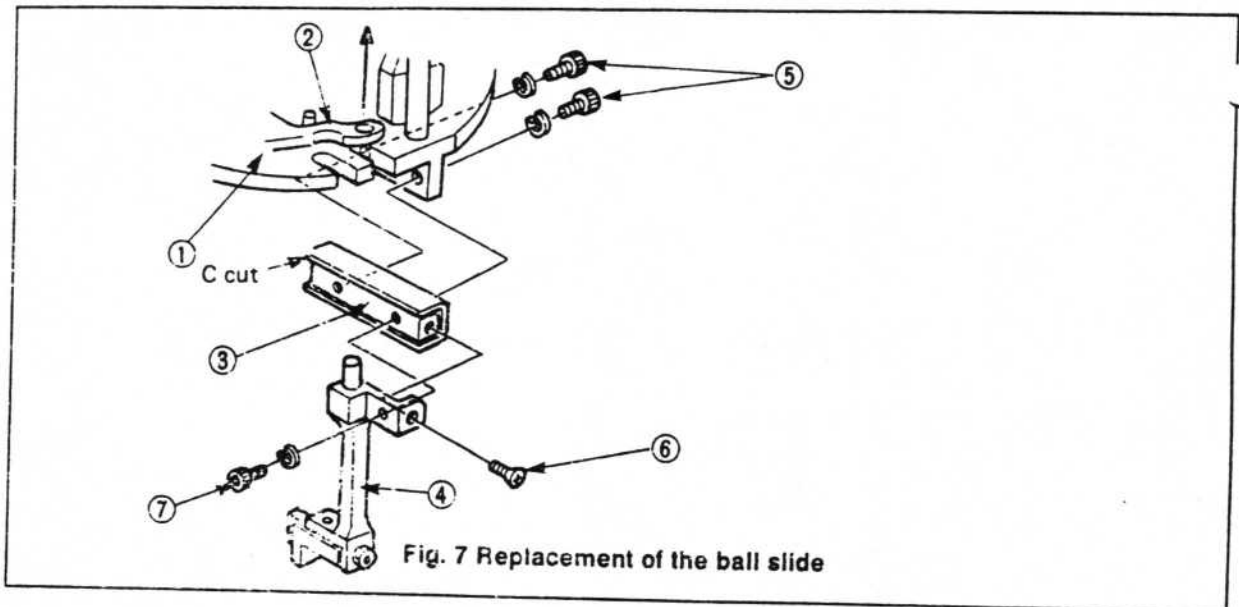
### 7. Ball slide replacement.

#### Method of removal

- (1) Remove the screws (⑤), x 2) holding the ball slide (③) to the chucking base (①), and remove the ball slide from the bottom.
- (2) Remove the screws (⑥ (⑦), x 2) holding the arm (④) to the ball slide.

#### Method of assembly

- (1) Place the ball slide's chamfering on the inside as in the figure on the right, and attach to the arm (④).
- (2) Insert the arm's parallel pin in the long hole of lever A (or lever B), push the ball slide's upper surface against the lower surface of the chucking base and secure with the screws (⑤).



8. Replacement of finger A and finger B (see Fig. 8).

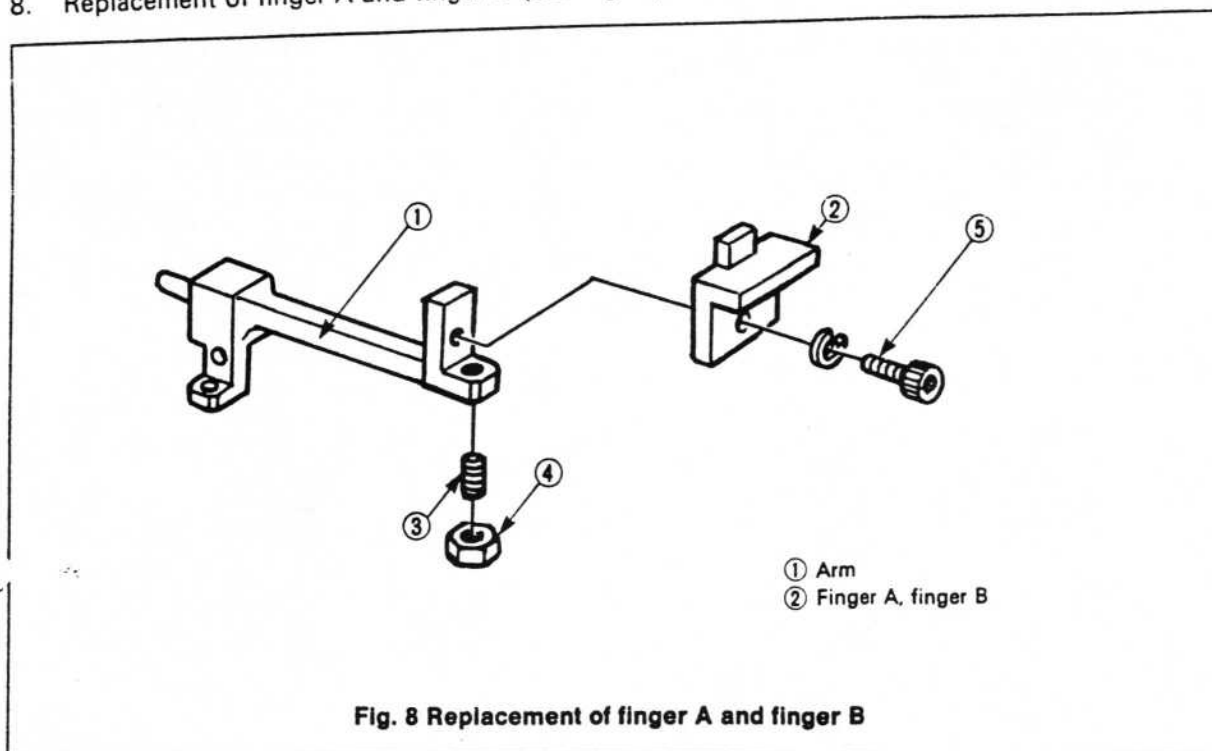


Fig. 8 Replacement of finger A and finger B

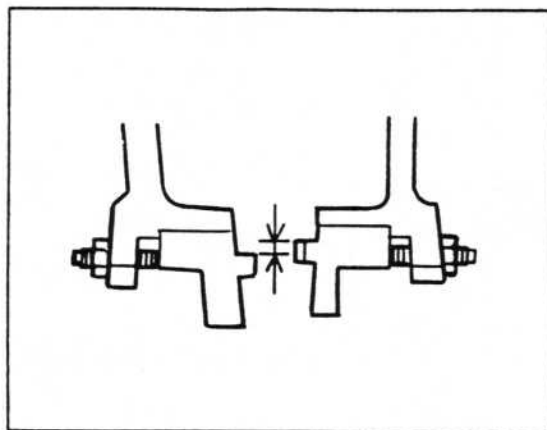
**Method of removal**

Remove the screws ⑤ holding finger A and finger B to the arm ①, and remove fingers A and B.

**Method of assembly**

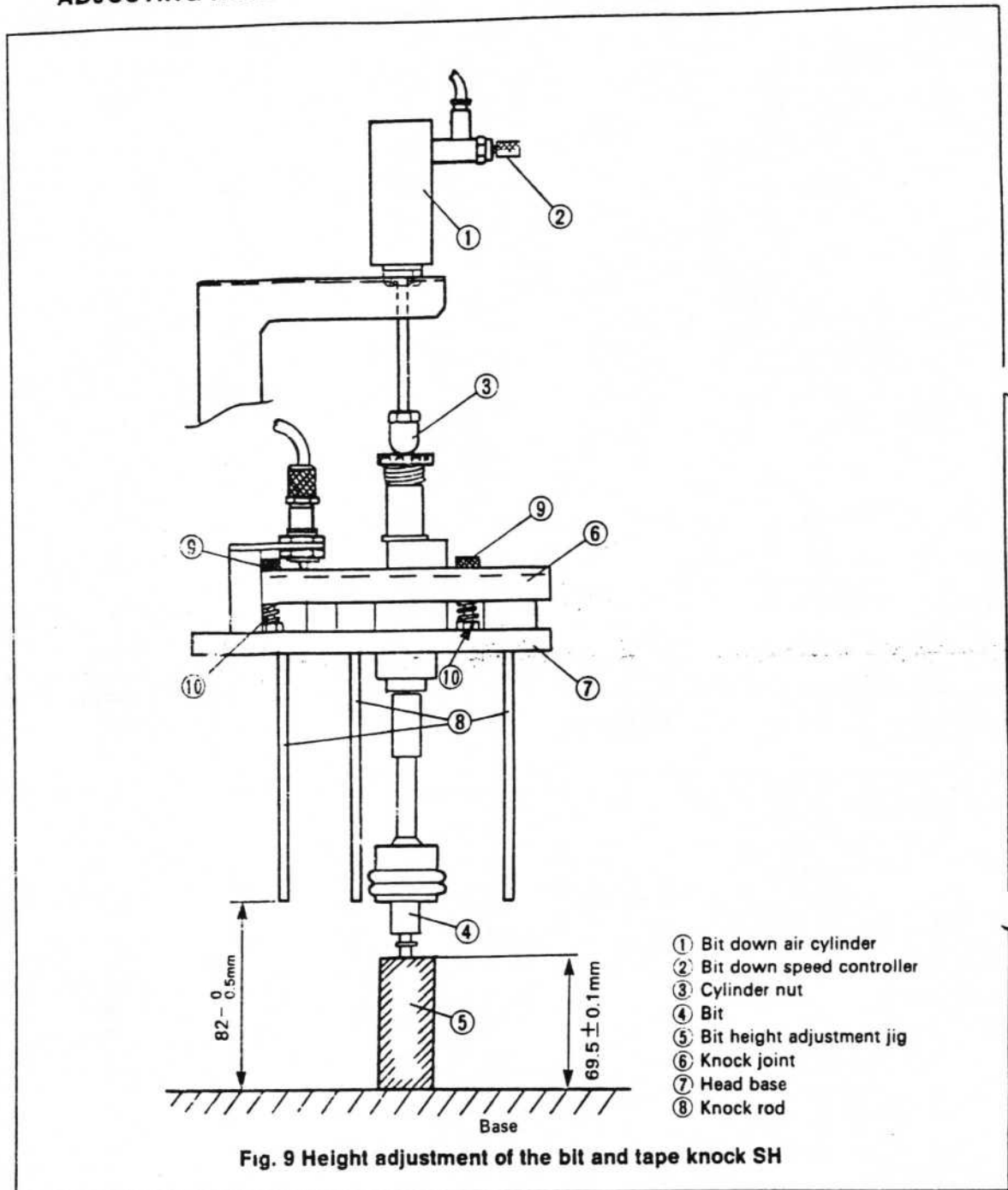
Assembly is carried out in the reverse order of removal. However, some adjustment of the chuck center is required using the screw ③ and nut ④.

\* See Adjustment Manual - 9 for the adjustment procedure. If the fingers are out of alignment as in the figure (right), insert a spacer between the arm and finger and align the finger heights (4 in all) correctly.



## 2. \_\_\_\_\_

### ADJUSTING HEAD



#### 1. Height adjustment of the bit end when the bit is down (see Fig. 9).

- (1) Loosen the cylinder nut ③ held by the double nut arrangement at the end of the bit down air cylinder ①.
- (2) Insert a system disk in the computer, switch to TEST mode and operate the air cylinder ① to lower the bit.

- (3) Place the bit height adjustment jig directly beneath the bit as in the figure.
- (4) Turn the cylinder nut until the end of the bit is level with the top of the adjustment jig, and secure it in position with the double nut.

**Note:**

Carry out this operation with bit 1, 2 or 3.

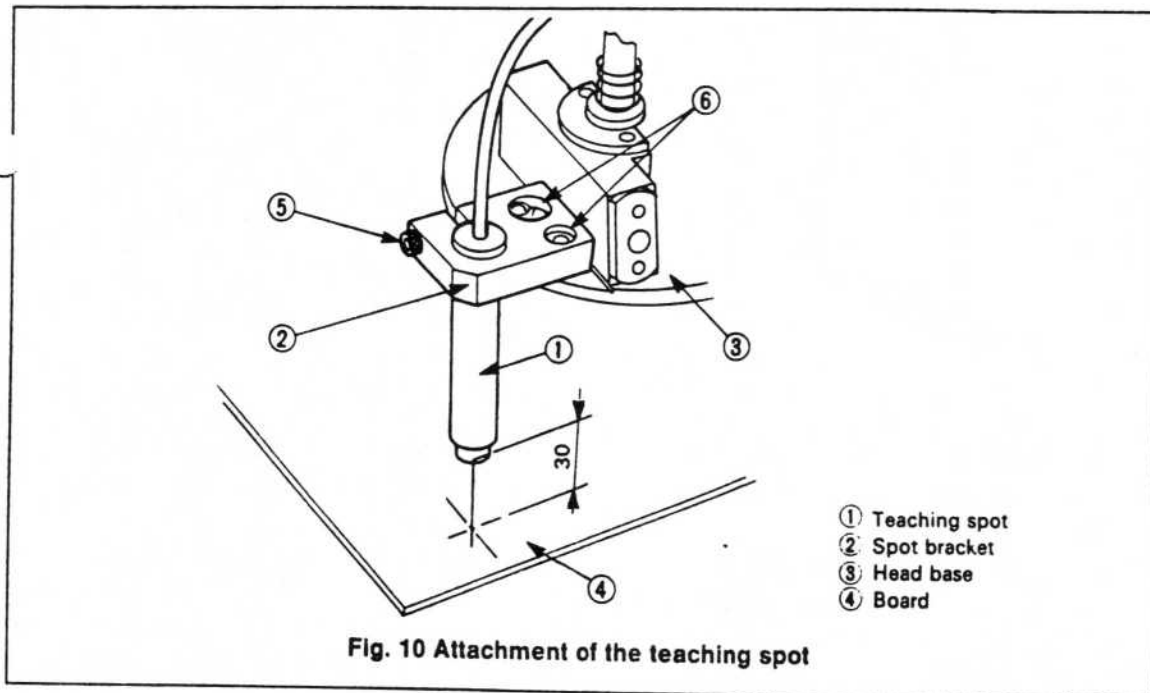
2. Knock rod height adjustment (see Fig. 9)

- (1) Loosen the nuts ( ⑩ , x 2).
- (2) Adjust the set screws ( ⑨ , x 2) so that the height of the knock joint ( ⑥ ) end from the base is  $82 - \begin{smallmatrix} 0 \\ 0.5 \end{smallmatrix}$  mm.
- (3) Tighten the nut ( ⑩ ) to the base, and tighten the set screws ( ⑨ ).

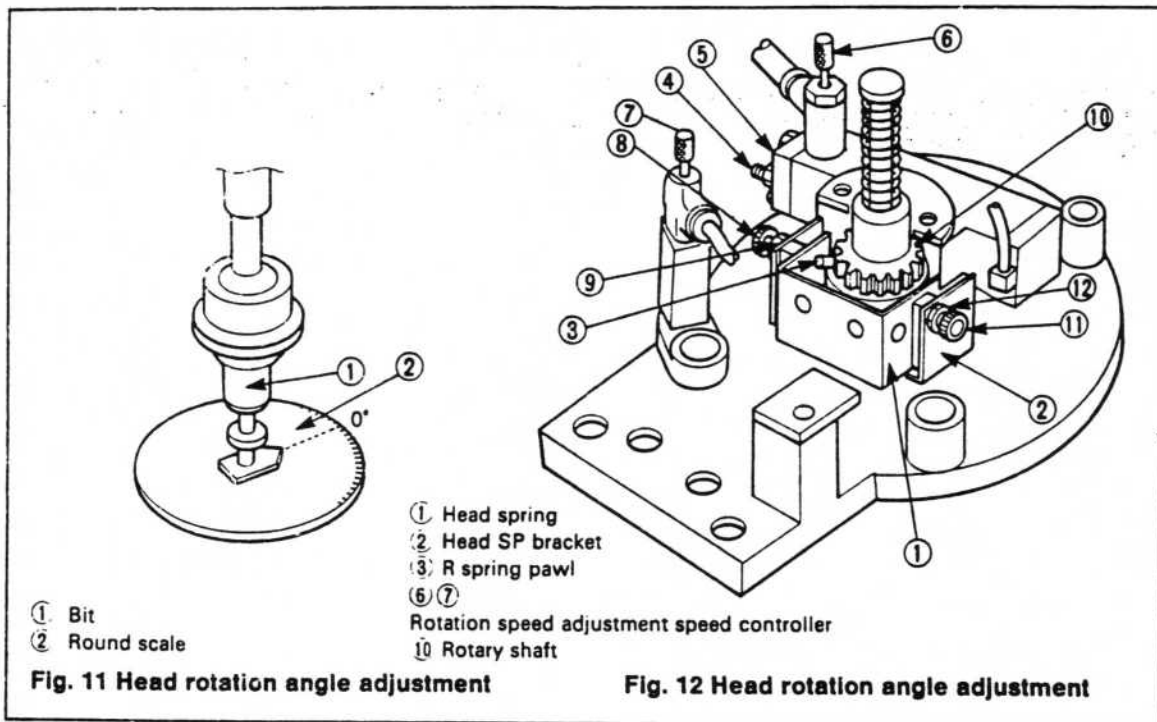
3. Bit down speed adjustment (see Fig. 9).

- (1) Check that the height from the base has been adjusted to  $69.5 \pm 0.1$  mm when the bit is down in accordance with Adjustment Manual - 1. Readjust if the height is outside this limit.
- (2) Fully shut down (turn knob clockwise) the speed controller ( ② ) attached to the bit down speed controller air cylinder ( ① ).
- (3) Use the bit down speed controller software:  
Input DOWN TIME : 160  $\mu$ s  
UP TIME : 180  $\mu$ s
- (4) Repeat the bit UP/DOWN operation while gradually opening up the speed controller.
- (5) Place the bit height adjustment jig ( ⑤ ) under the bit.
- (6) When the end of the bit reaches the top of the adjustment jig (69.5 mm from the base), tighten the speed controller lock nut to fix the knob in position.

4. Adjustment of the teaching spot attachment position (see Fig. 10)



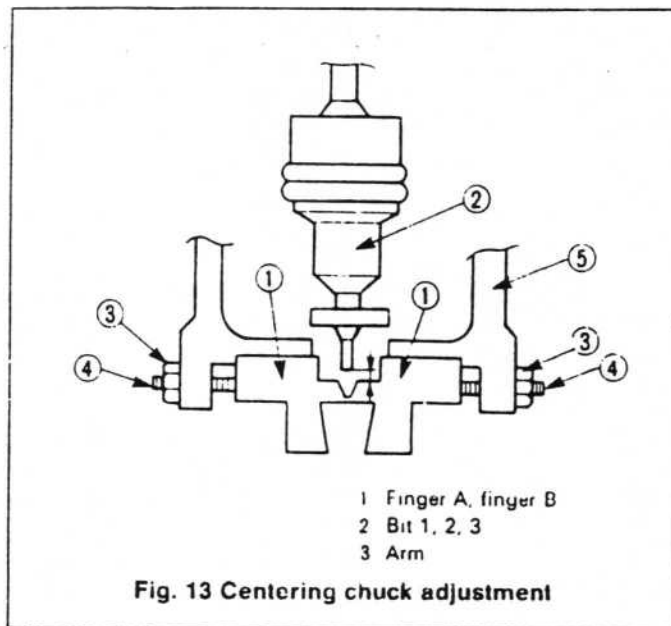
- (1) Loosen the set screw ⑤ holding the teaching spot to the spot bracket, and adjust the spot so that the bottom of the teaching spot is [30 mm] from the board. Tighten the set screw ⑤.
  - (2) Carry out operations given in the operations section - ("System set up") of the Instruction Manual.
  - (3) Select "Mount Data" input on the Main Menu.
  - (4) Press the teaching/bit (f-2) key and carry out teaching of the teaching spot adjustment location on the board.
  - (5) Press the teaching/spot (f-3) key. (At this time, if the teaching spot center is not out of alignment, shift that center position to the bit teaching position (4)).
  - (6) If the teaching spot position differs from the bit teaching position (4), loosen the set screws (⑥, x 2) holding the spot bracket ② to the head base ③, move the spot bracket, align the center of the light with the bit teaching position and tighten the set screws ⑥.
5. Adjustment of the head rotation angle (see Figs. 11, 12).
- (1) Use the bit with the pointer attached to the end.
  - (2) Look up the "System set up" operations in the operations section of the Instruction Manual and set the equipment in operation.
  - (3) Select "TEST" on the Main Menu. Next select "BIT" and rotate the bit 90°.
  - (4) Loosen the nuts ⑨ ⑫ on the set screws ⑧ ⑪ pressed against the head spring ①, until there is no pressure on the head spring.



- (5) Apply pressure to the gear section of the rotary shaft ⑩ in the counterclockwise direction with your finger to take up the slack.
- (6) Tighten in the set screw ⑧ until the head spring is pressed lightly against the R spring port ③, and tighten the hexagonal nut ⑨. At this time the deflection of the head spring should be below 0.2 mm.

- (7) Place an angle scale under the bit (see Fig. 11) and align the pointer on the end of the bit with the "0" mark.
  - (8) Return the rotation angle to zero.
  - (9) Apply pressure to the gear section of the rotary shaft (10) in the clockwise direction with your finger to take up the slack.
  - (10) Check that the pointer on the bit end indicates 90°. If it doesn't, carry out the procedure below. If the pointer does indicate 90°, carry out operations from (12) below.
  - (11) Loosen the nut (5) and, while carrying out (9) above, turn the set screw (4), adjust so that the pointer reads  $90^\circ \pm 0.5^\circ$ , and tighten the nut (5).
  - (12) Tighten the set screws ((11) and (12) in part (4) above) in the same way as the procedure given in (6) above.
  - (13) Repeat rotation several times to check that the angle is  $+90^\circ$ . Adjustment is then complete.
6. Head rotation speed adjustment (see Fig. 12).
- (1) Check that the head rotation angle is  $90^\circ$  (see Adjustment Manual - 5).
  - (2) Fully shut down (clockwise) the speed controller knobs (speed controllers - (6) and (7) in Fig. 12).
  - (3) Use the head rotation speed adjustment software, and input 110 ms for the plus direction and minus direction.
  - (4) Slowly open the speed controller knobs while repeating rotation of the rotary shaft (10) clockwise and counterclockwise.
  - (5) Tighten the speed controller lock nuts to fix the knobs in position as the R spring pawl (3) contacts the head spring.
7. Centering chuck height adjustment (see Fig. 13).

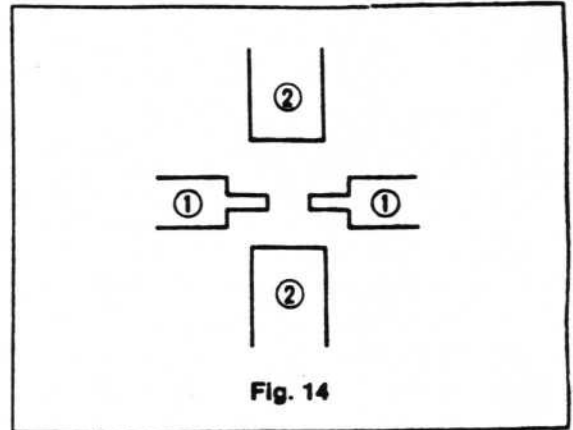
- (1) Attach bit 1, 2 or 3 to the head.
- (2) Attach the centering chuck unit to the head unit in accordance with Replacement Manual - 2.
- (3) Check that the gap between the top of fingers A, B, (1) and the end of the bit is 0.05 - 0.1mm with a thickness gauge.
- (4) If the gap is less than 0.05 mm, place a spacer between the cylinder block (4) in Fig. 1) and head base (1) and secure it in position.
- (5) If the gap is over 0.1 mm, place a spacer between the head base (1) (see Fig. 1) and the main unit, and secure with the set screws (11).
- (6) Carry out (3) above once more to check that the gap is within 0.05 - 0.1 mm. Adjustment is then complete.





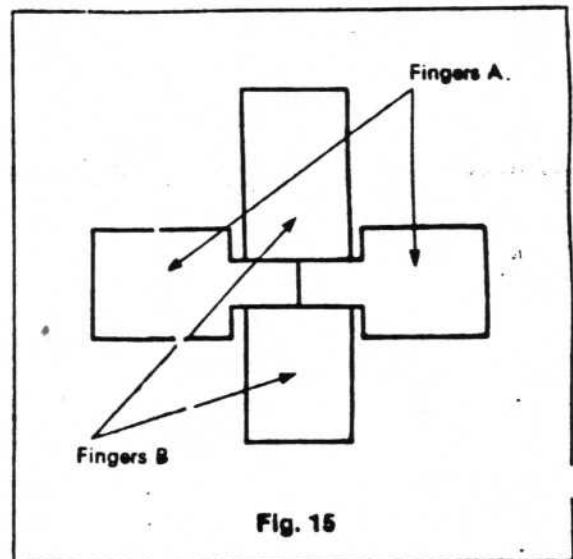
8. Adjustment of the centering chuck's chucking speed.

- (1) Turn the knobs on the speed controllers (⑤ in Fig. 1) attached to the cylinder block ④ clockwise and fully shut down.
- (2) Use the centering chuck's chucking speed adjustment software and input CLOSE TIME 200  $\mu$ s, OPEN TIME 120  $\mu$ s.
- (3) Move the fingers A (x 2) (see Fig. 14), slowly open the speed controller (counterclockwise), and tighten the lock nuts of the speed controller when the other fingers A make contact.
- (4) Move the other finger pair B ②, and slowly open up the other speed controller. If the speed controller is opened too far the finger pair A ① will be clamped between the fingers of B ②. Fasten the controller's lock nut so that this is avoided.



9. Adjustment of the chuck center position (see Fig. 13).

- (1) Loosen the nuts (③, x 4) attached to the arm.
- (2) Carry out operations in the "System set up" part of the Operations Manual.
- (3) Select TEST on the Main Menu and turn on the chuck.
- (4) Turn ④ so that the finger pair A chuck center position, aligns with the center of the bit and tighten the nuts ③.
- (5) Open fingers A manually so that the chuck center of fingers B can be seen.
- (6) Adjust fingers B as in (4) above.
- (7) Operate the chuck several times and check that it comes together as in Fig. 15.



# 3. \_\_\_\_\_

## LUBRICATION

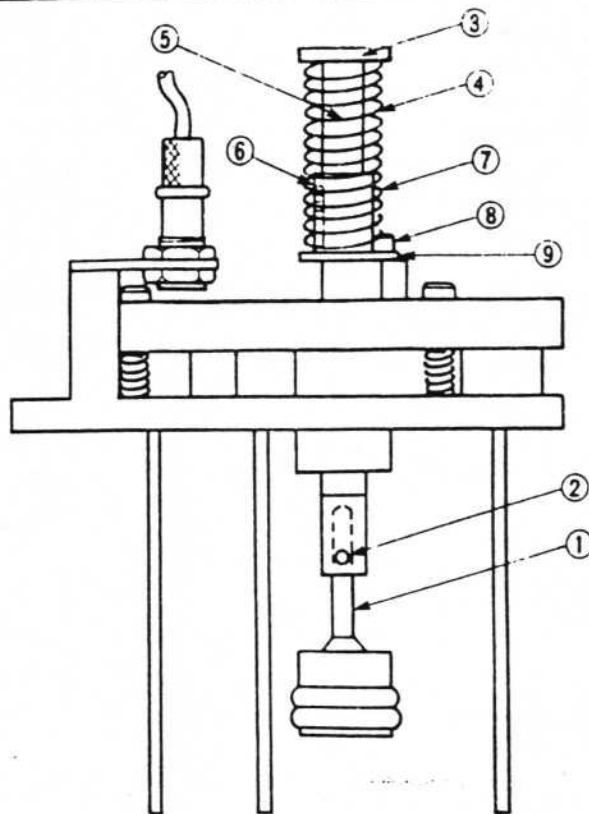


Fig. 16

- 1 Damper shaft
- 2 Damper screw
- 3 Knock cap
- 4 Spring
- 5 Slide shaft
- 6 Slide shaft screw
- 7 Rotary shaft
- 8 Washer securing screw
- 9 Slide shaft washer

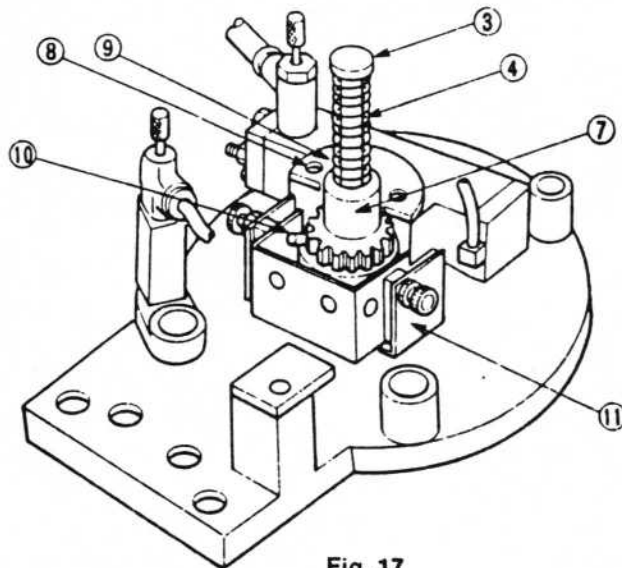


Fig. 17

- 3 Knock cap
- 4 H slide spring
- 7 Rotary shaft
- 8 Washer, securing screw
- 9 Slide shaft washer
- 10 R spring pawl
- 11 Head SP bracket

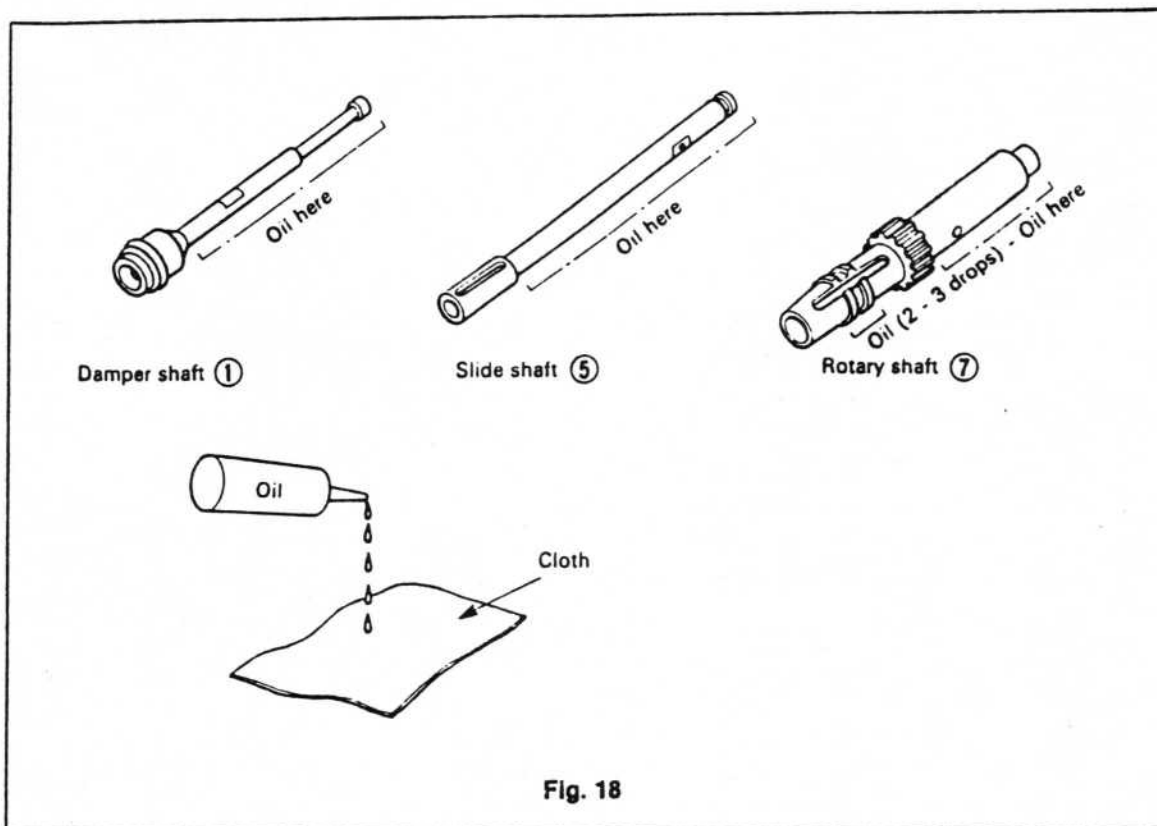


Fig. 18

1. Lubrication points

- (1) Damper shaft
- (2) Slide shaft
- (3) Rotary shaft
- (4) Contact surface of the R spring pawl and head SP bracket

2. Parts removal (see Fig. 16)

- (1) Remove the damper screw (2) and pull out the damper shaft (1) from below.
- (2) Remove the knock cap (3) and remove the HR spring (4). Next remove the slide shaft screw (6) and pull out the slide shaft (5) from the bottom.
- (3) Remove the slide shaft washer (9), take out the securing screws (8, x 2) and remove the rotary shaft (7) from the top.

3. Lubrication method

- (1) Damper shaft (1)  
Slide shaft (5)  
Rotary shaft (7) — Apply silicon oil as shown in Fig. 18 (see 4. Type of oil) to a cloth and wipe the areas marked.
- (2) Place 2 - 3 drops of silicon oil in the groove of the rotary shaft (7).
- (3) When the above have been finished, reassemble the parts in order.
- (4) Put silicon oil on the contact surface of the R spring pawl (12) and head SP bracket.

#### 4. Type of oil

(1) Manufacturer : Fenwal Inc.

Product name : Lubit-8

## 4.

### **TROUBLESHOOTING**

Check the following items when the head fails to operate correctly.

Item	Checkpoint	Measures to take
UP/DOWN operation	1) Check whether the bit UP/DOWN operation is normal.	See Replacement Manual - 3.
	2) Check for dirt on the slide shaft and dumper shaft.	See Lubrication Manual - 3.
	3) Check whether the solenoid valve is operating.	Replace solenoid valve.
	4) Is the tubing connected properly	Connect tubing correctly.
Centering chuck fault	1) Is the centering chuck cylinder operation normal?	See Replacement Manual - 5.
	2) Check whether the solenoid valve is operating.	Replace solenoid valve.
	3) Is the tubing connected properly.	Connect tubing correctly.
Rotation	1) Is there dirt on the rotary shaft ?	See Lubrication Manual - 3.
	2) Is the solenoid valve operating ?	Replace solenoid valve.
	3) Is the tubing connected properly.	Connect tubing correctly.
Suction failure	1) Is the ejector operating normally ? Check the vacuum.	Replace ejector.
	2) Is the tubing connected properly ?	Connect tubing correctly.
Tape knock fault	1) Is the tape knock shaft bent ?	Replace shaft.
	2) Is the tape knock cylinder operating normally ?	See Replacement Manual - 4.
	3) Is the tubing connected properly ?	Connect tubing correctly.

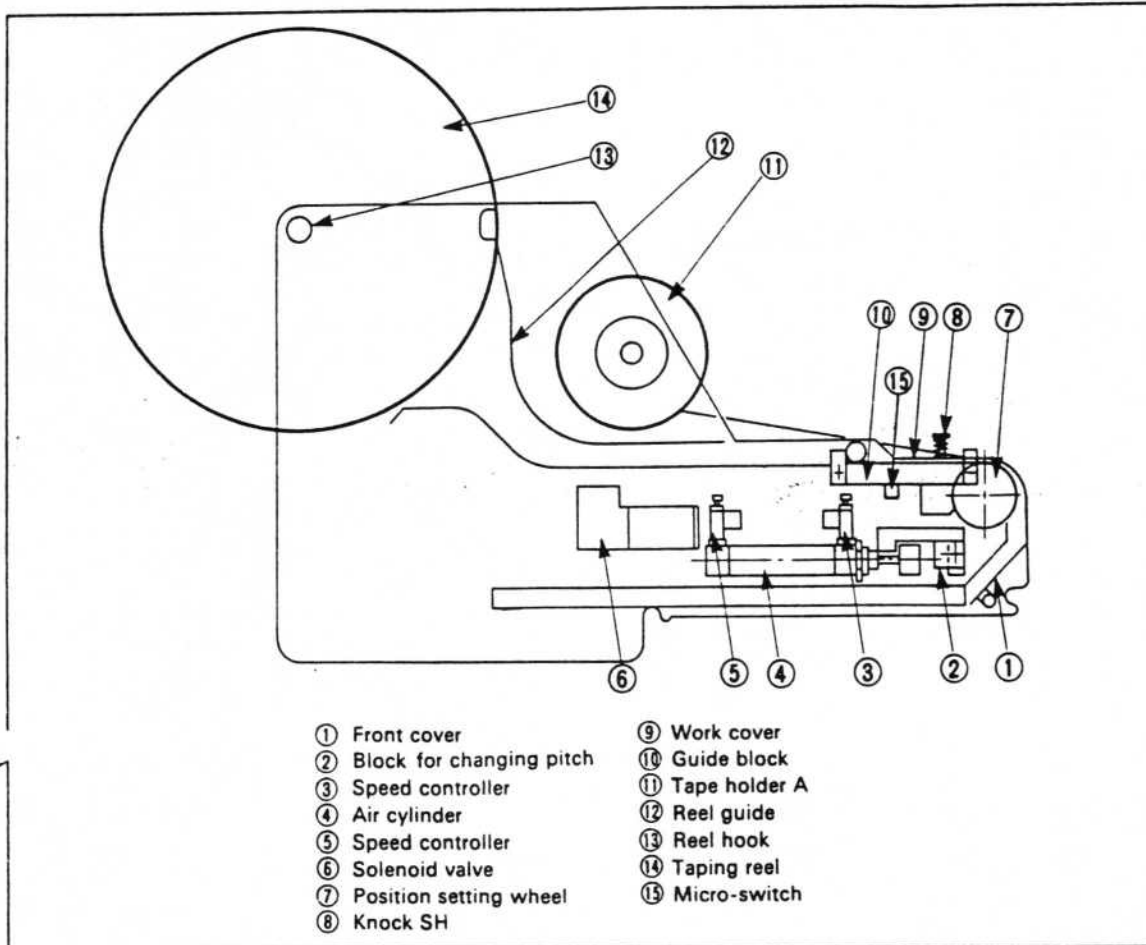
# TAPE FEEDER UNIT

Section

# 3

1.

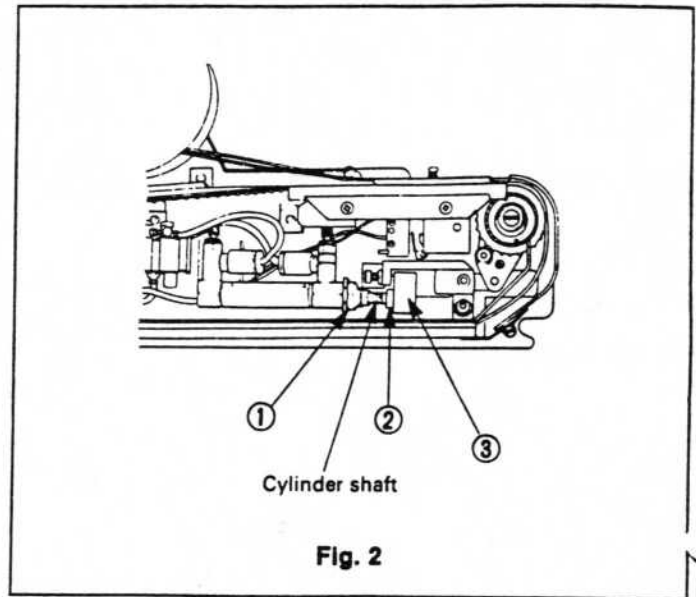
## REPLACEMENT



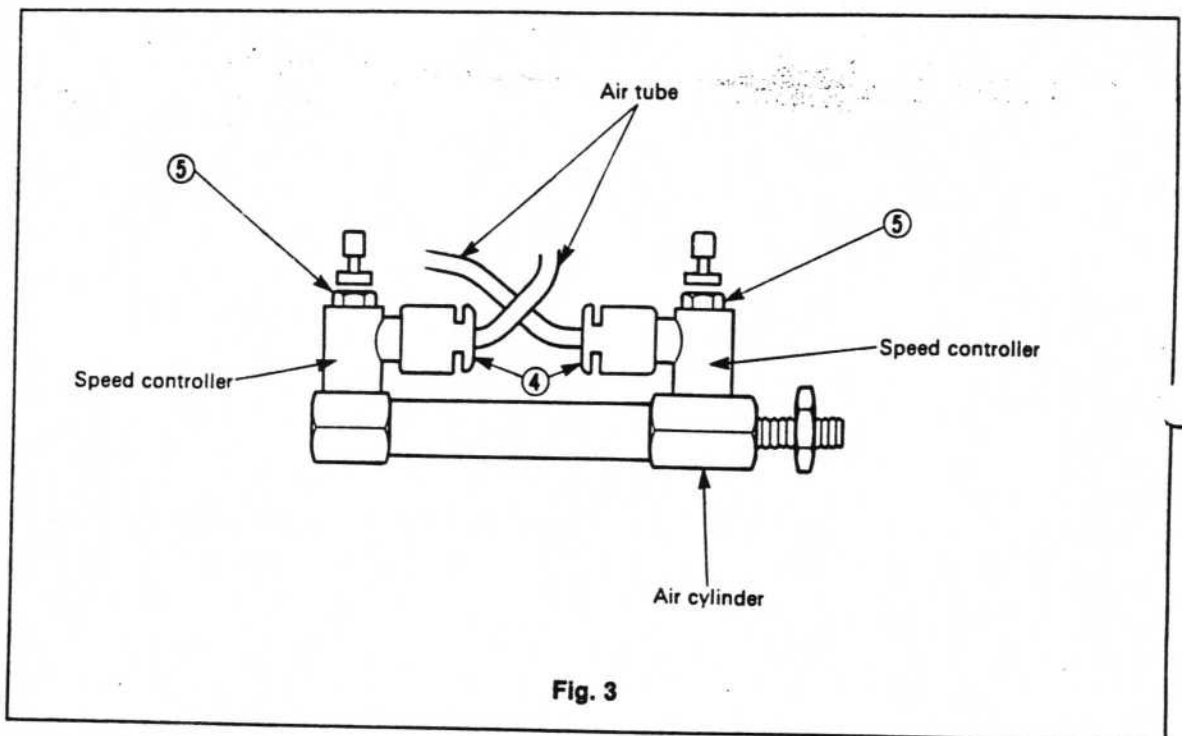
Replace parts according to the procedures given below. Switch OFF all mechanisms and release the air pressure to 0 kg/cm<sup>2</sup>

### 1. Air cylinder removal

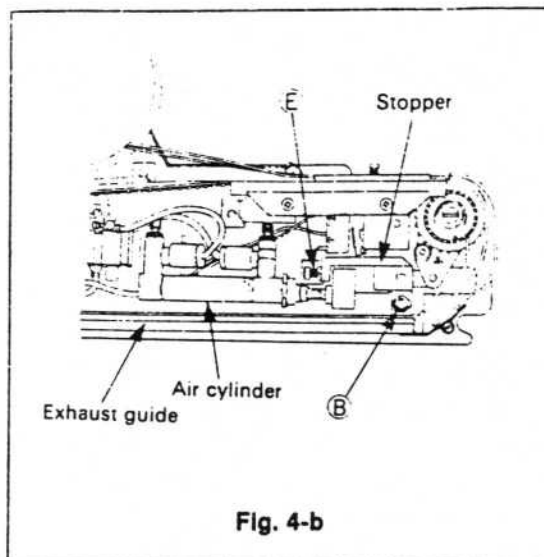
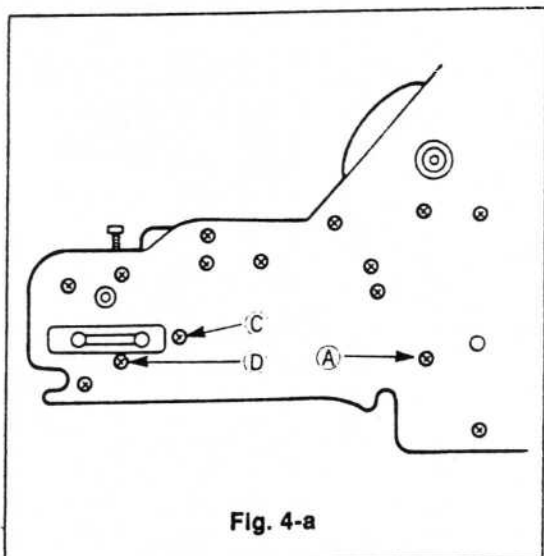
- (1) Loosen the hexagonal nut ① (see Fig. 2).
- (2) Loosen the hexagonal nut ② and keep turning until it contacts the base of the cylinder shaft thread section (see Fig. 2).
- (3) Keep turning the hexagonal nut ② until the cylinder shaft is disengaged from the block ③ (see Fig. 2).



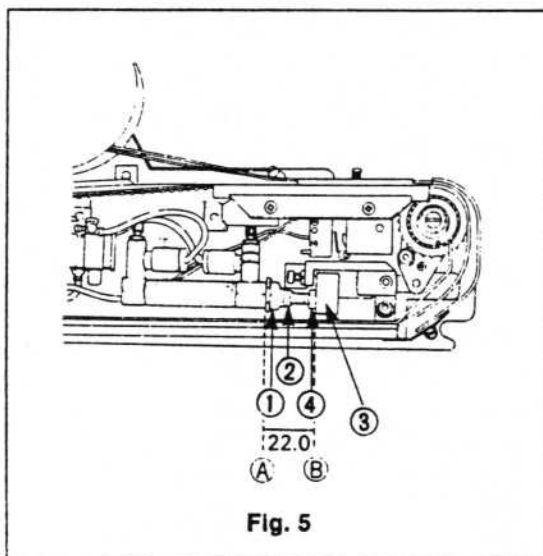
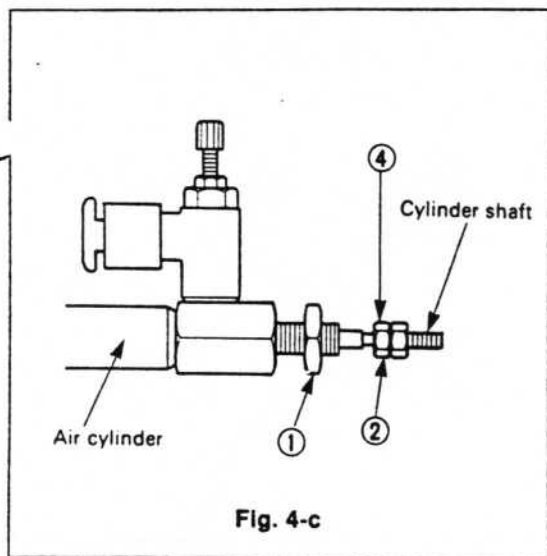
- (4) Press parts ④ of the speed controller and remove the attached air tubes. Turn the speed controllers' hexagonal nuts ⑤ and remove the speed controllers from the air cylinder (see Fig. 3).



## 2. Air cylinder attachment



- (1) Remove screw (A) (see Fig. 4-a).
- (2) Remove hexagonal nut (B) (see Fig. 4-b).
- (3) Remove the exhaust guide from the tape feeder unit (see Fig. 4-b).
- (4) Remove screws (C) and (D), and remove the stopper (see Fig. 4-a, 4-b). Do not move the bolt or hexagonal nut (E) attached to the stopper.
- (5) Prepare hexagonal nut (M4) (4).
- (6) Attach the hexagonal nut (M4) (4) to the cylinder shaft and lock it with the other hexagonal nut (2) (see Fig. 4-c).
- (7) Place the air cylinder in the tape feeder unit and secure in position with the hexagonal nut (1).
- (8) Screw the cylinder shaft into the block (3) (see Fig. 5). Turn the hexagonal nut (2) making sure that it does not contact the cylinder shaft directly.



(9) Turn the hexagonal nut ② until the gap between end A of the air cylinder and end B of the block ③ is 22.5 mm.  
Check that the gap between ends A and B is 22.0 mm with a set of Vernier calipers. Unscrew the double nut arrangement (hexagonal nuts ② and ④) and fasten hexagonal nut ④ to the end of block ③. Screw hexagonal nut ② to the base of the cylinder shaft's thread section (see Fig. 5).

- (10) Attach the stopper to the tape feeder unit
- (11) Attach the exhaust guide to the tape feeder unit.

### 3. Removal of the micro-switch

- (1) Remove the screws (①, x 2) (see Fig. 6).
- (2) Remove the block ② (see Fig. 6).
- (3) Remove the screws (③, x 2) (see Fig. 6).

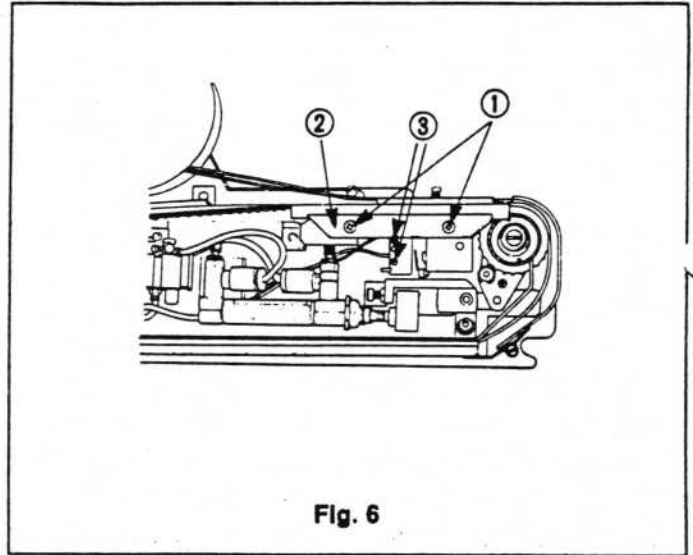


Fig. 6

### 4. Removal of the solenoid valve

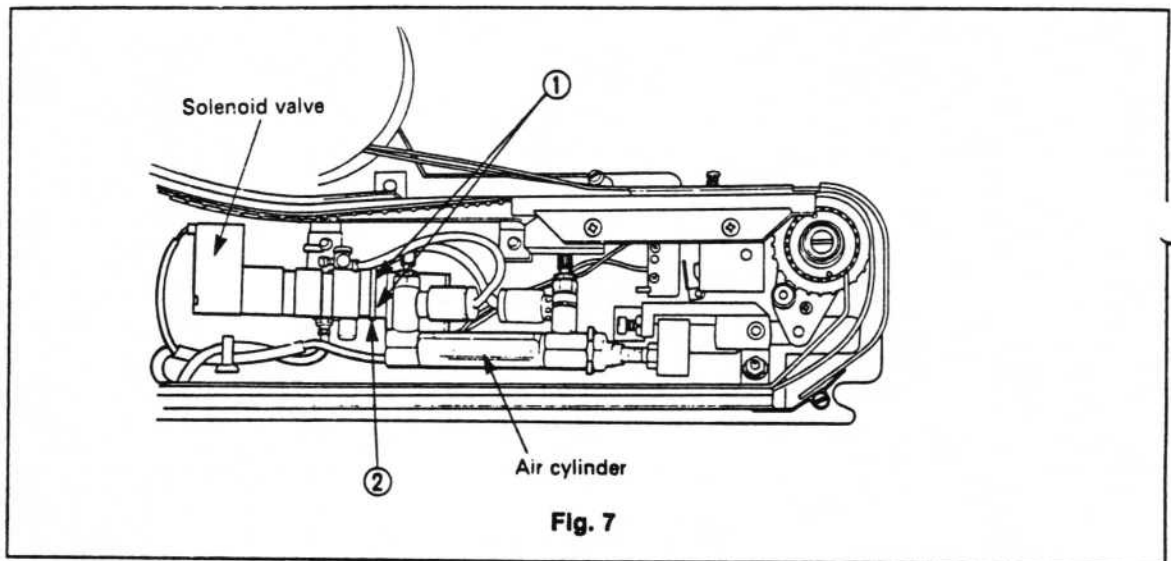


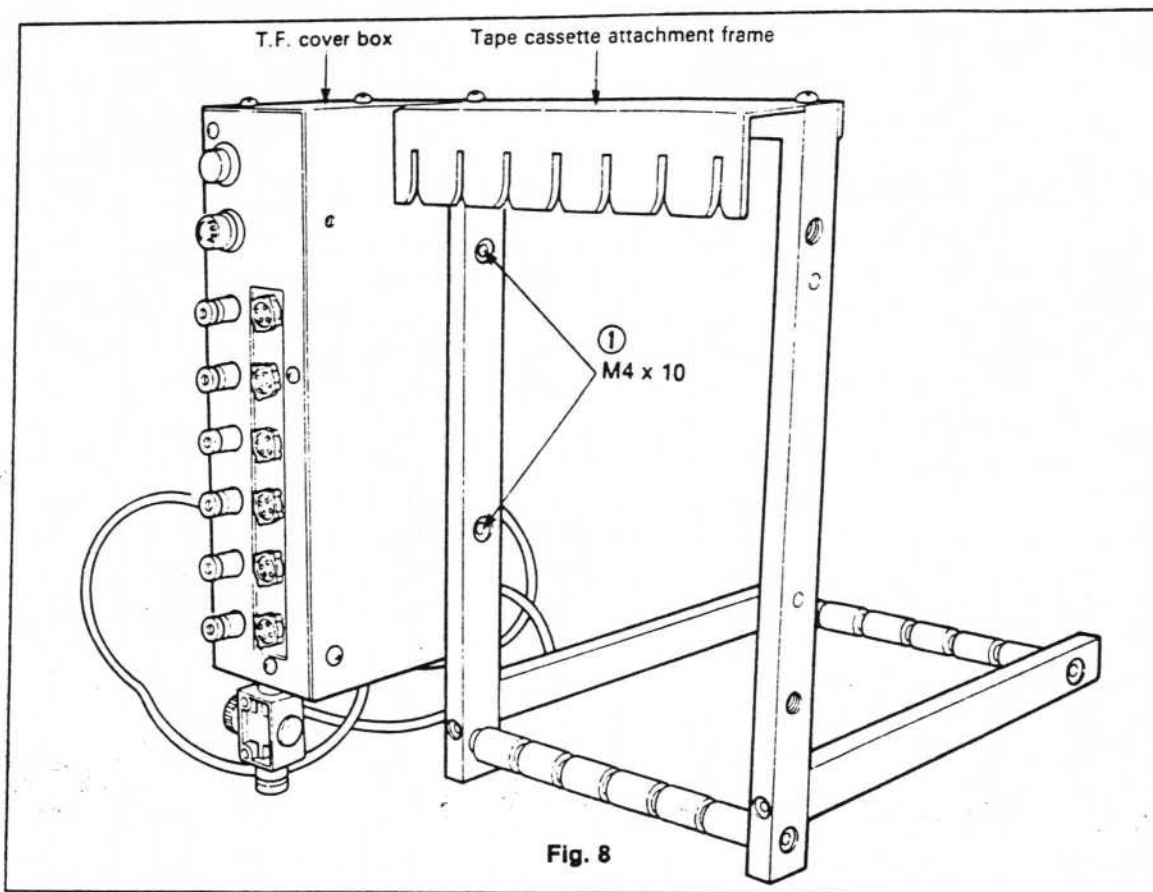
Fig. 7

- (1) Remove the air cylinder from the tape feeder unit in accordance with "1. Air cylinder removal".
- (2) Remove the air tube connected to the speed controller, which is attached to the air cylinder.



(3) Remove the screws (1), x 2) from the side of the solenoid valve's attachment bracket (2).

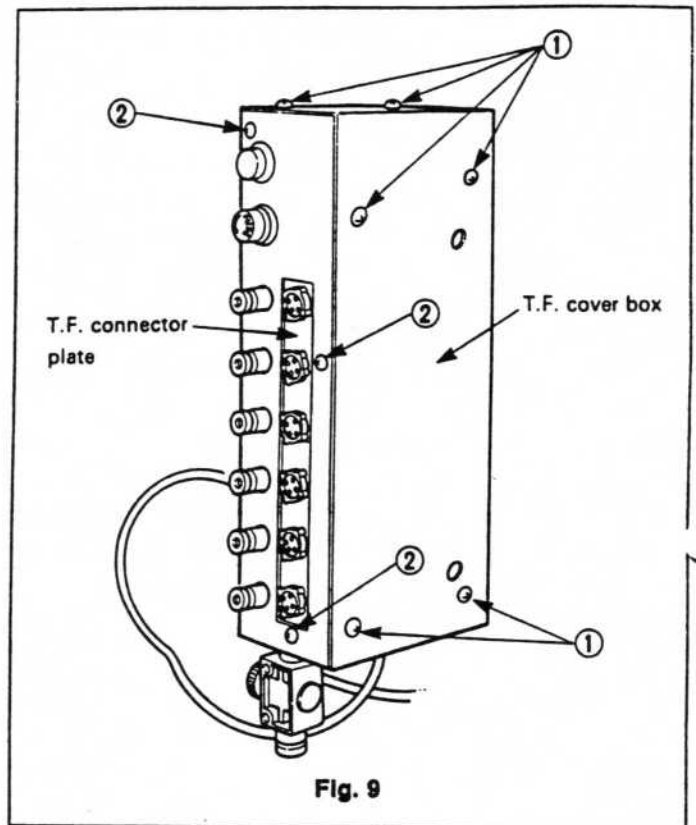
5. Removal of the T.F. cover box



(1) Remove the screws (1) (M4, x 2) and remove the T.F. cover box from the tape cassette attachment frame (see Fig. 8).

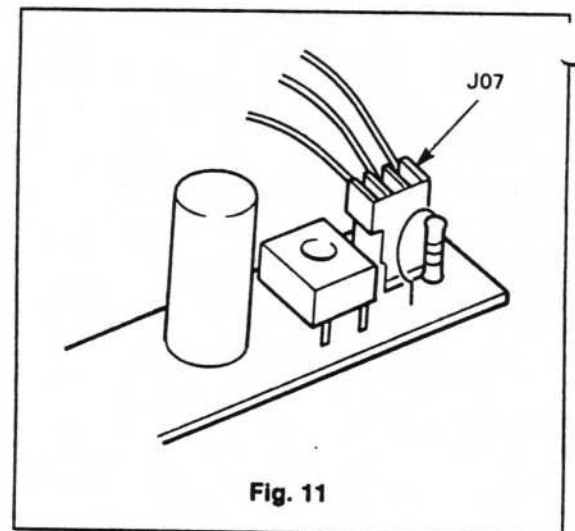
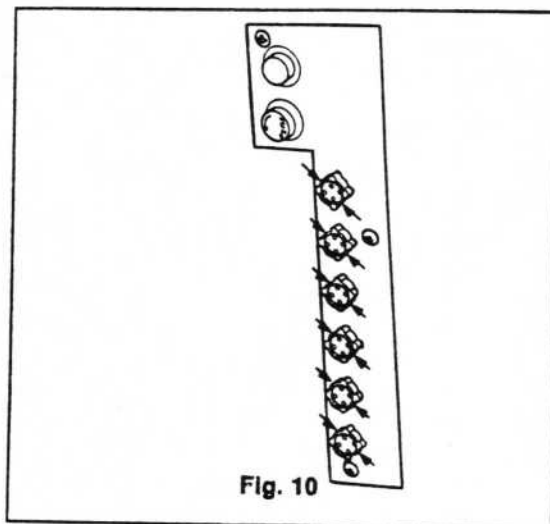
6. Removal of the T.F. connector plate

- (1) Remove the screws (①, x 6) and take off the T.F. cover box lid (see Fig. 9).
- (2) Remove the screws (②, x 3) and remove the T.F. connector plate from the T.F. cover box (see Fig. 9).



7. Removal of the tape feeder board assembly

- (1) Remove the T.F. connector plate in accordance with "6. Removal of the T.F. connector plate".
- (2) Press the knobs for each connector (arrows in Fig. 10) and remove the connectors from the T.F. connector plate.
- (3) Remove J07 from the tape feeder board assembly (see Fig. 11).



## 8. Switch removal

- (1) Remove the T.F. connector plate in accordance with "6. Removal of the T.F. connector plate".
- (2) Remove the insulation cover ① from the switch in the direction indicated (see Fig. 12).
- (3) Unsolder switch leads with a soldering iron.
- (4) Turn the ring ② holding the switch counterclockwise and remove it.

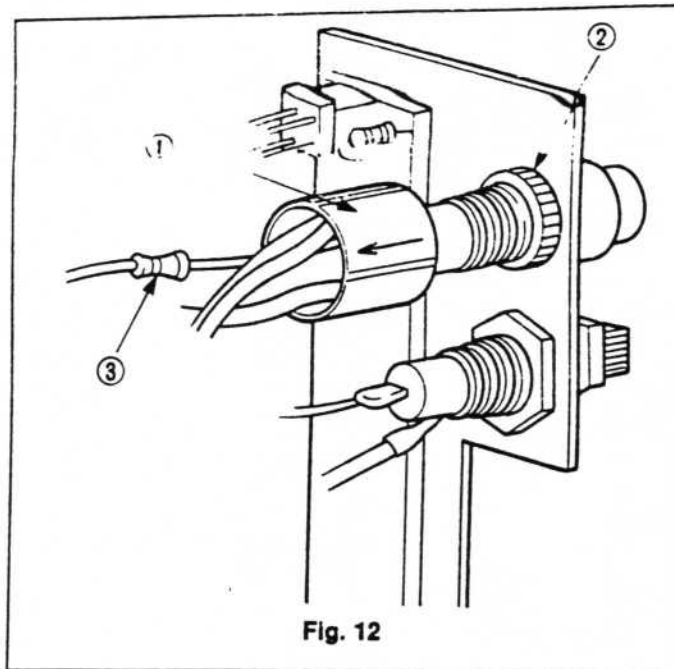


Fig. 12

## 9. Removal of the resistor

- (1) Remove the T.F. connector plate in accordance with "6. Removal of the T.F. connector plate".
- (2) Remove the insulation cover ① from the switch in the direction indicated (see Fig. 12).
- (3) Remove the resistor lead ③ (33 k ohm 1/4 W) from the soldered connection with the switch and also on the opposite side (see Fig. 12).

## 10. Removal of the transformer

- (1) Remove the screws (①, x 6) and take off the lid of the T.F. cover box.

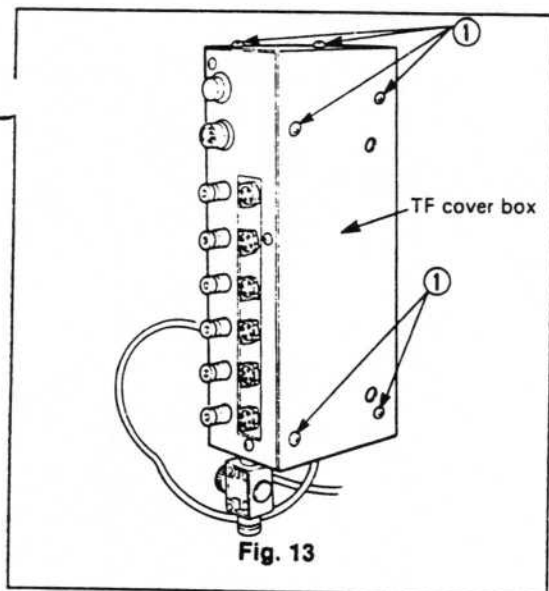


Fig. 13

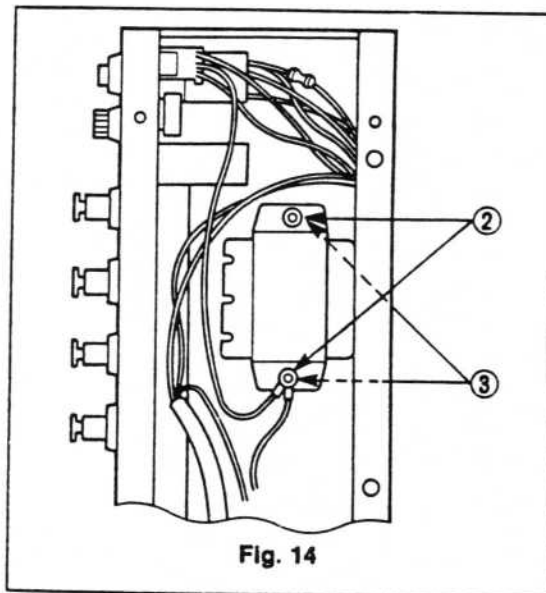
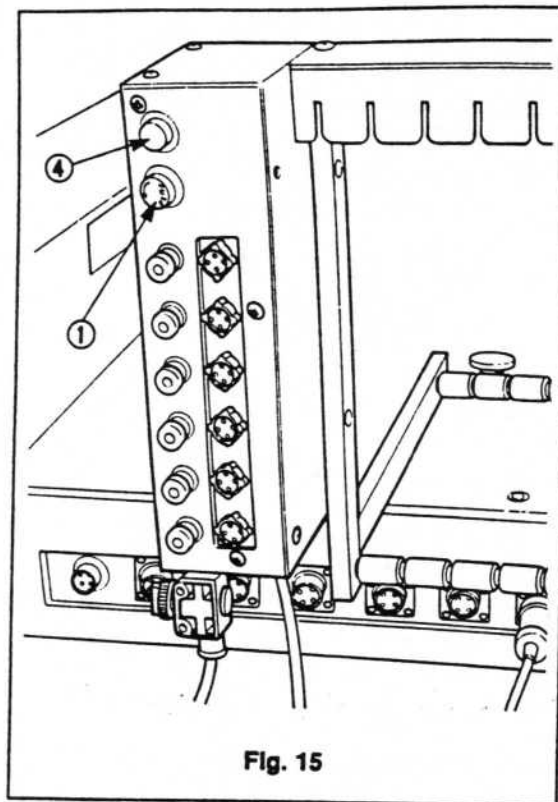
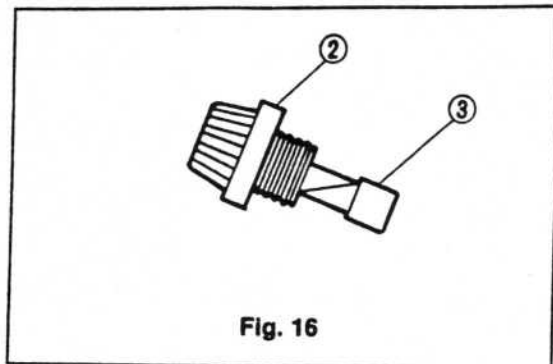


Fig. 14

- (2) Remove the hexagonal nuts (②, x 2) and screws (③, x 2) (outer cover) and remove the transformer.
- (3) Unsolder the leads to the transformer terminals with a soldering iron.

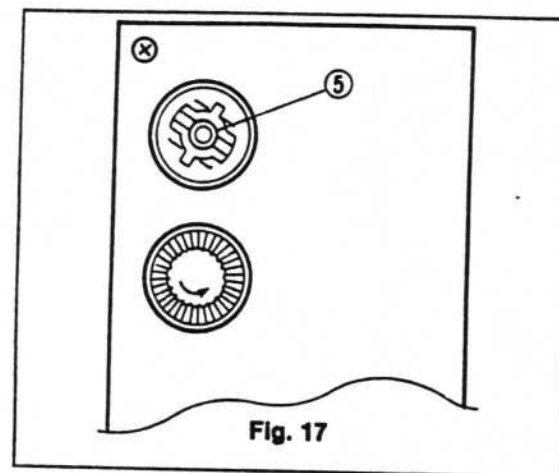
#### 11. Removal of the fuse

- (1) Turn the fuse holder cap ① counterclockwise and remove (see Fig. 15).
- (2) Take the fuse ③ from the fuse holder cap ② (see Fig. 16)



#### 12. Removal of the switch button and switch lamp

- (1) Grip and remove the switch button ④ (see Fig. 15).
- (2) Pinch the switch lamp ⑤ and remove it. (see Fig. 17).



## 2.

### ADJUSTMENT

#### 1. Parts feeder speed adjustment

(1) Set the tape feeder unit's switching block for a feed amount of 8 mm (see Fig. 18).

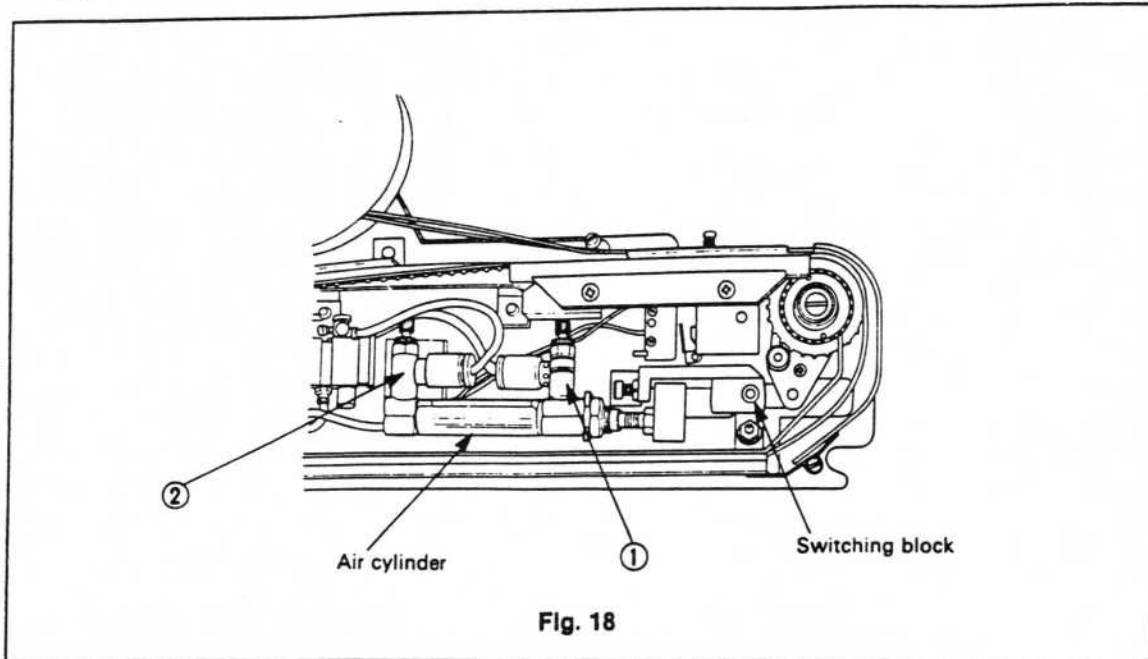
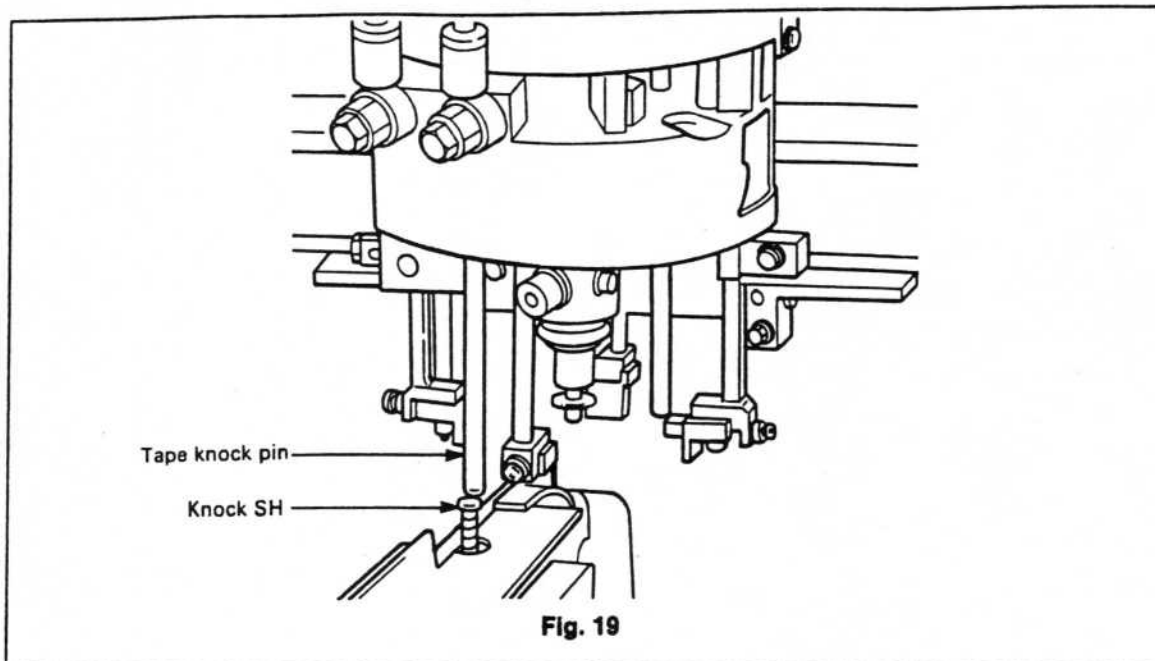


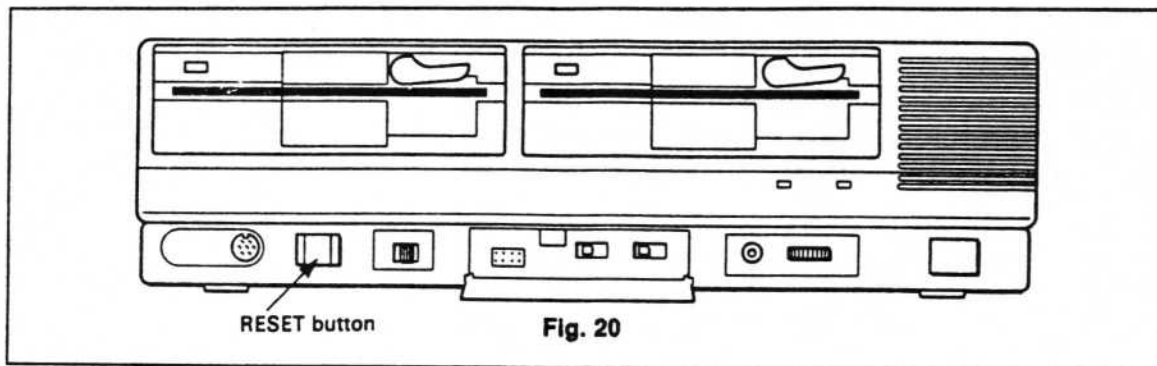
Fig. 18

- (2) Fully shut down the speed controller ① attached to the air cylinder (clockwise) and fully open the speed controller ② (counterclockwise) (see Fig. 18).
- (3) Set the tape cassette's attachment frame in the mounter main unit.
- (4) Insert a system disk and data disk in the PC 8801, and switch on the mounter main unit and system controller (PC 8801).
- (5) Set the tape feeder unit on the tape cassette attachment frame and connect the power cord and air tube.

- (6) Switch the mouter to TEACHING mode, move the head with the switch on the main unit's operation panel and align the tape knock pin with the tape feeder unit's knock SH position (see Fig. 19).



- (7) Replace the system disk with the speed controller adjustment disk in the PC 8801 and press the RESET button.



- (8) Set the tape knock UP TIME and DOWN TIME with the PC 8801 as below:  
UP TIME : 900  $\mu$ s  
DOWN TIME : 200  $\mu$ s
- (9) Run the program to move the head's tape knock pin UP/DOWN and operate the tape feeder's air cylinder.

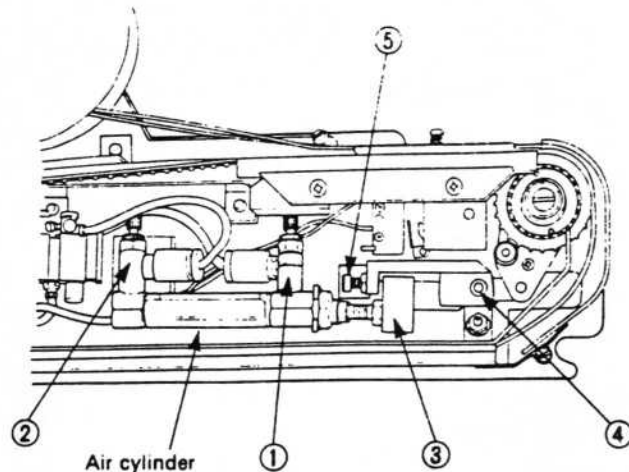


Fig. 21

- (10) Gradually open up the speed controller ① (counterclockwise) and tighten the speed controller lock nut when the block ③ contacts the switching block ④ (see Fig. 21).
- (11) Stop the program and shut down the speed controller ② (clockwise) (see Fig. 21).
- (12) Set the tape knock UP TIME and DOWN TIME with the PC 8801 as below:  
 UP TIME : 400  $\mu$ s  
 DOWN TIME : 900  $\mu$ s
- (13) Run the program to move the head's tape knock pin UP/DOWN and operate the tape feeder's air cylinder.
- (14) Gradually open up the speed controller ② (counterclockwise), and tighten the speed controller lock nut when the block ③ contacts the screw ⑤ (see Fig. 21).
- (15) Stop the program and set the UP TIME and DOWN TIME with the PC 8801 as below:-  
 UP TIME : 400  $\mu$ s  
 DOWN TIME : 200  $\mu$ s
- (16) Run the program to move the head's tape knock pin UP/DOWN and operate the tape feeder's air cylinder.

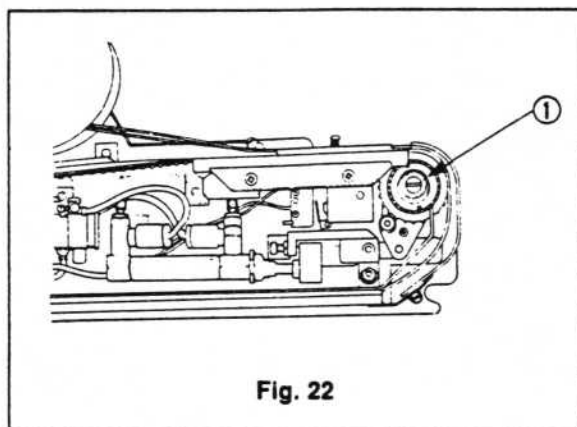


Fig. 22

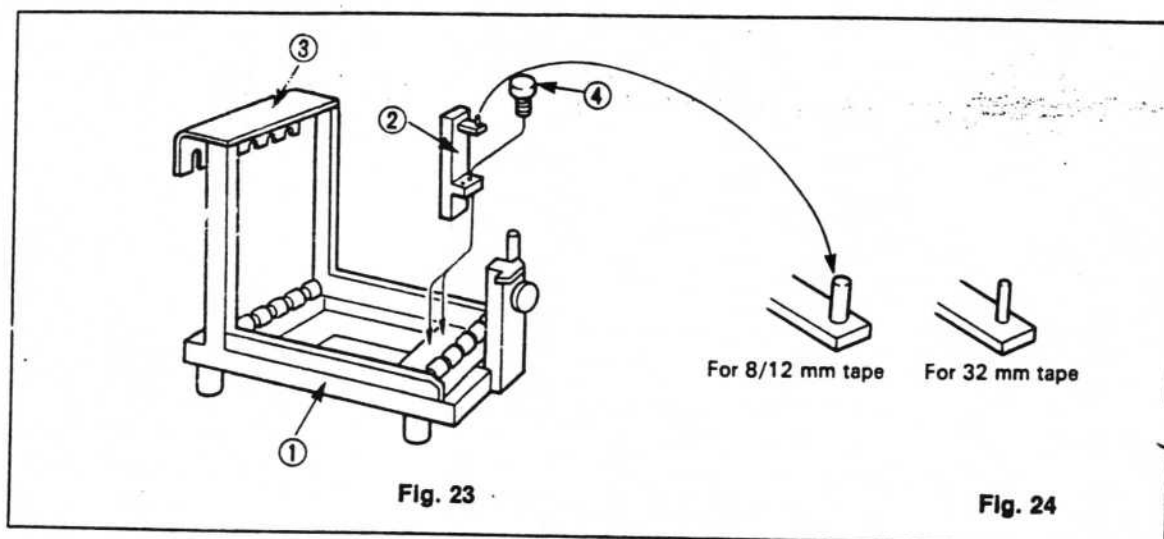
- (17) At this time check that the wheel's tape feeder pins are being fed two at a time.
- (18) Stop the program.

## 2. Adjustment of the positioning wheel

- (1) Attach the home position alignment jig (2) to the positioning wheel jig (1) with the screws (4), x 2 (see Fig. 23).
- (2) Move the dial gauge (1), see Fig. 26) until the end contacts the home position alignment jig shaft (see Fig. 26).
- (3) Set the dial gauge to "0" at the point of contact.
- (4) Return the dial gauge to its original reading and remove the home position alignment jig.
- (5) Set the tape feeder to the positioning wheel jig shown in Fig. 23.
- (6) Hold the tape feeder with your right hand so it does not move, and move the tape feeder block (1) with your free hand.
- (7) Bring the dial gauge (see Fig. 28) into contact with the pin of the positioning wheel.
- (8) Check that the gauge reads 0.02 - 0.05 mm.

### <Adjustment when the gauge reading does not conform to the above>

- (1) Loosen the nut (4) (see Fig. 27) and move the set screw (3). When pressed, the gauge reading should be large. When screwed, the gauge reading should be small.
- (2) When the dial gauge reading is between 0.02 mm and 0.05 mm, rotate the block another 5 - 6 turns and, if the gauge reading is still within 0.02 mm - 0.05 mm, tighten the nut (4) and the set screw (3).





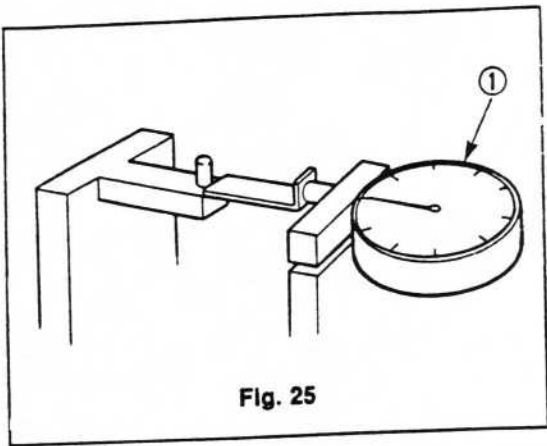


Fig. 25

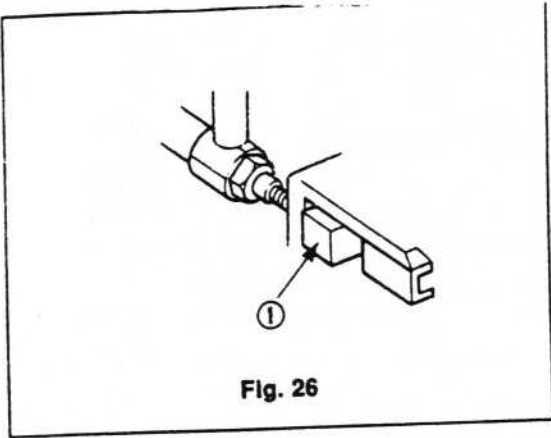


Fig. 26

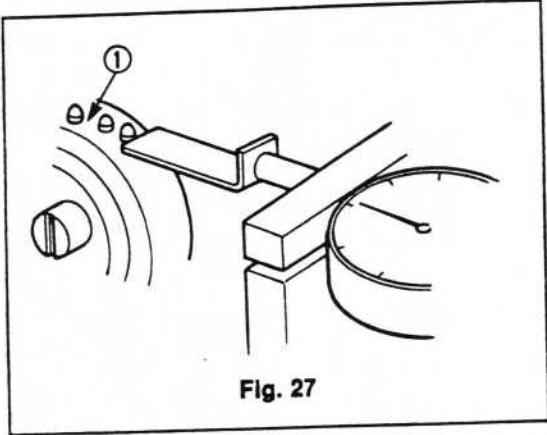


Fig. 27

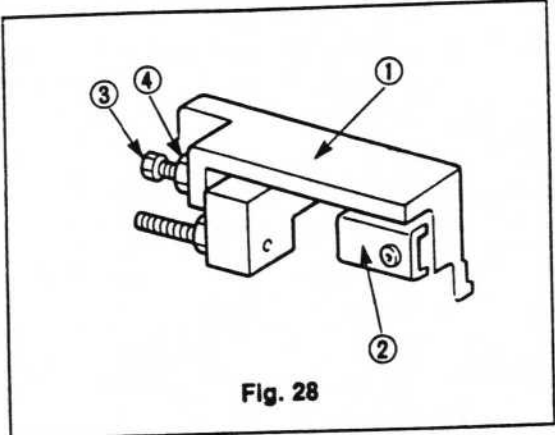


Fig. 28

**3.****TROUBLESHOOTING**

Item	Checkpoint	Measures to take
Fuse	Check that the fuse is not burnt out	Replace fuse - Replacement Manual - 11
Power switch	Remove the power connector and use a circuit tester with the switch ON.	Replace switch - Replacement Manual - 8
Transformer	Check for AC 18 V output when the power switch is ON.	Replace transformer - Replacement Manual - 10
Tape feeder board assembly	Check for DC 18 output between pin 1 - pin 2 of J1 - J6.	Replace tape feeder board assembly - Replacement Manual - 7
Micro-switch	Remove the tape feeder unit connector and use a circuit tester to check current flow between pin 1 and pin 2 of the connector while pressing the feeder unit's knock SH.	Replace switch - Replacement Manual - 3
Solenoid valve	Check that the solenoid valve operates when the tape feeder unit's knock SH is pressed.	Replace solenoid valve - Replacement Manual - 4
Speed controller	Check for looseness of the lock nut	Adjust speed controller - Adjustment Manual - 1
Air cylinder	Check that the air cylinder operates when the tape feeder's knock SH is pressed.	Replace air cylinder - Replacement Manual - 1,2
Positioning wheel	Check for standard amount of feed of parts.	Adjust positioning wheel - Adjustment Manual - 2

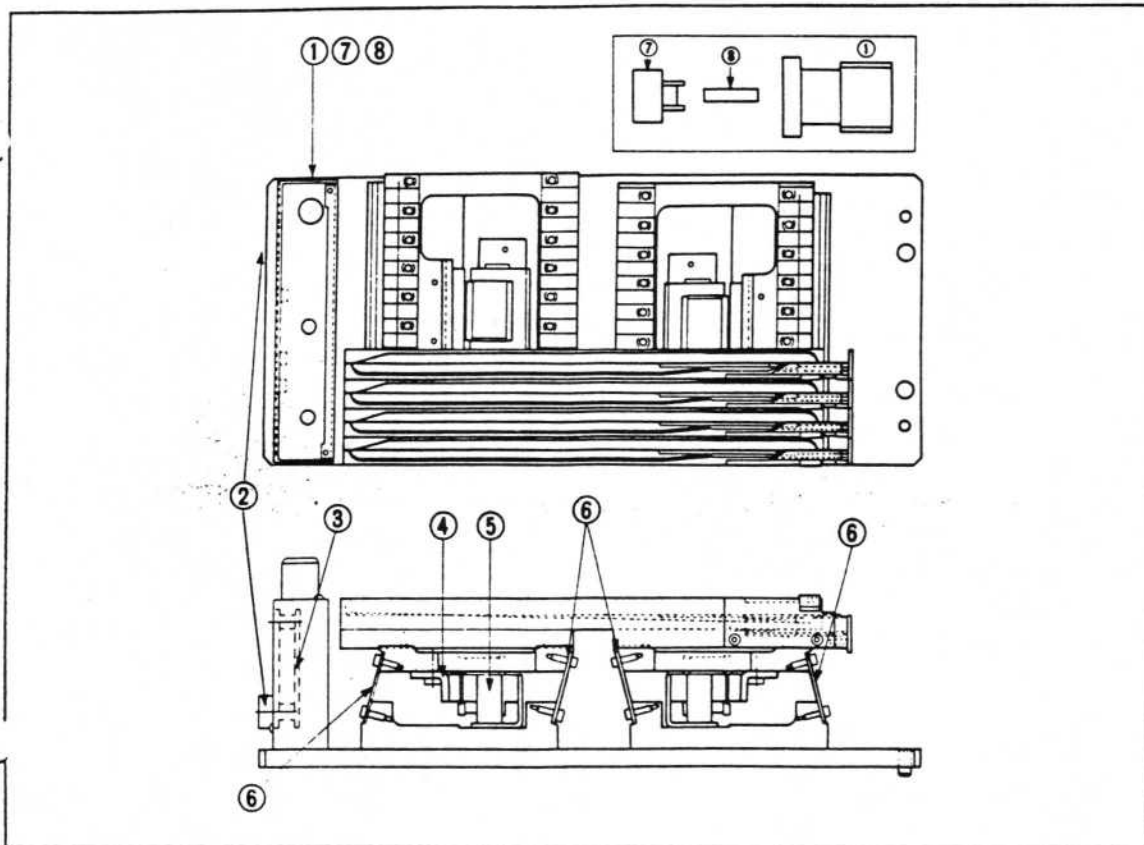
# BULK FEEDER UNIT

Section

# 4

1.

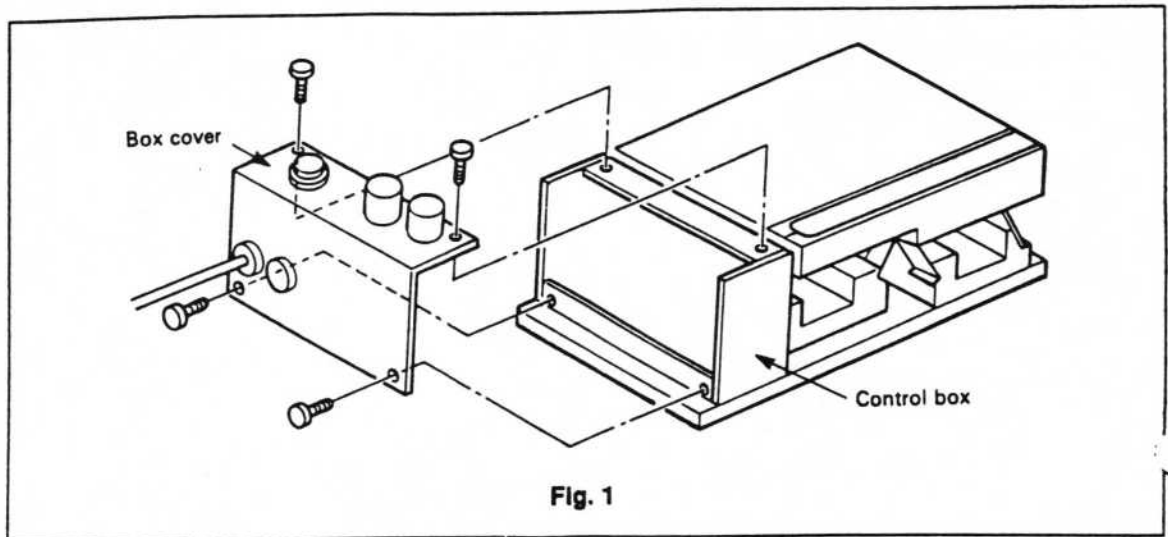
## REPLACEMENT



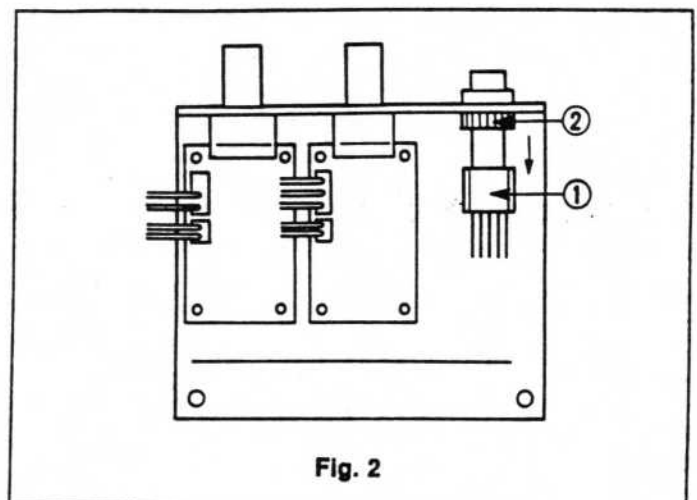
Number	Name	Number of parts
1	Illuminated switch	1
2	Fuse holder (fuse)	1
3	Feeder board assembly	2
4	Core	2
5	Coil assembly	2
6	Leaf springs	8
7	Switch button	1
8	Switch lamp	1

## 1. Switch replacement

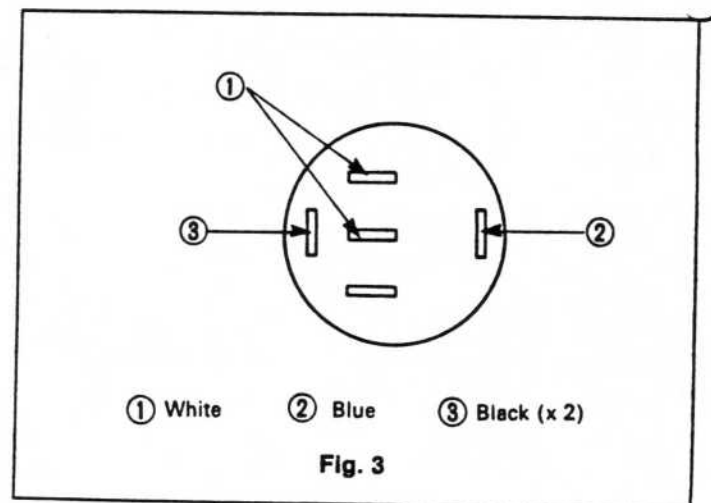
- (1) Remove the screws (x 4) shown in the figure below and remove the box cover (see Fig. 1).



- (2) Pull off the insulating cover ① from the switch in the direction indicated (see Fig. 2).
- (3) Turn the ring ② holding the switch counterclockwise and remove.
- (4) Unsolder the leads with a soldering iron.



- (5) Replace the switch and solder the terminals to the leads with a soldering iron (see Fig. 3).
- (6) Attach the box cover.



## 2. Fuse replacement

Turn the fuse holder (marked with arrow) counterlockwise to replace the fuse (see Fig. 4).

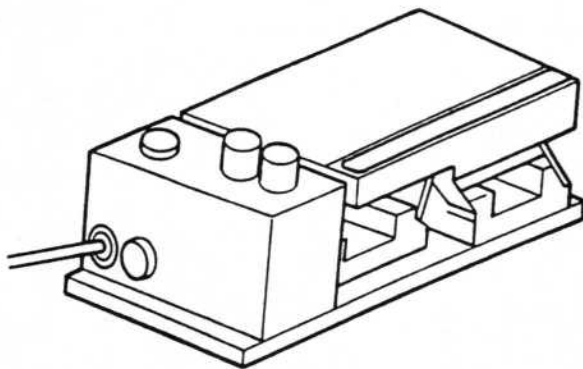


Fig. 4

## 3. Board replacement

- (1) Remove the box cover (see 1-(1) Switch replacement).
- (2) Remove the board connectors J1L, J1R, J2L, J2R (see Fig. 5).
- (3) Remove the screws (①, x 4) holding the board and replace the board.
- (4) Tighten screws ① and insert connectors according to their numbers.
- (5) Attach the box cover to the control box.

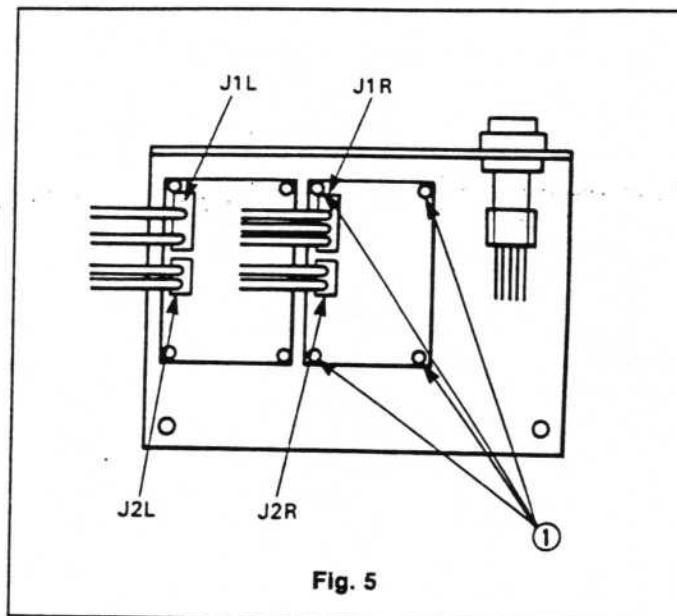


Fig. 5

#### 4. Core replacement

Remove the screws (①, x 2) holding the core, and replace the core (②).

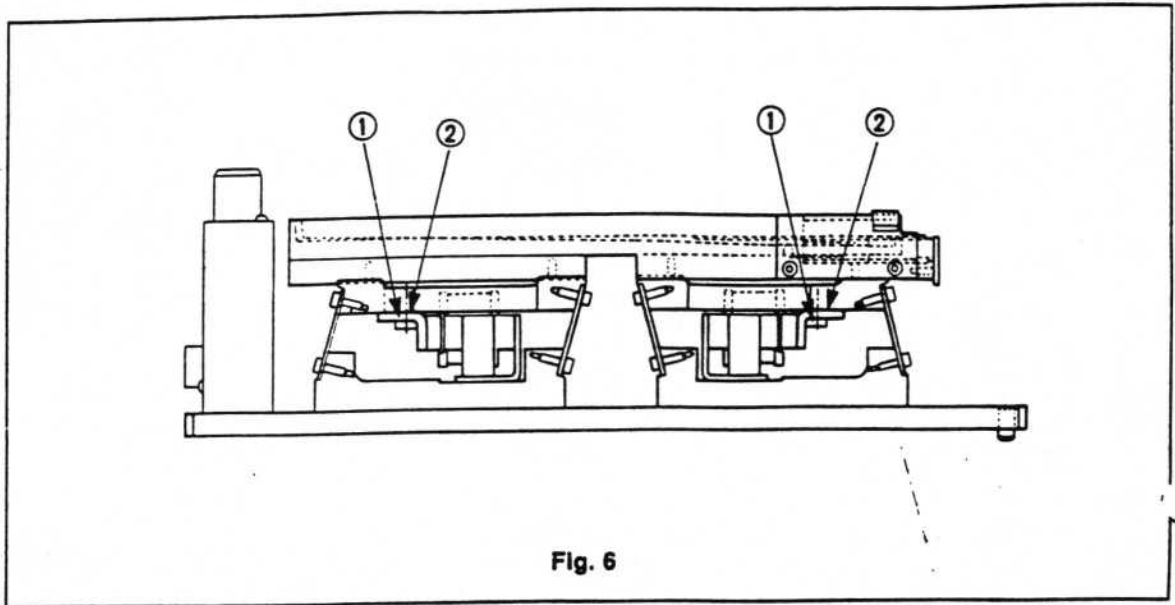


Fig. 6

\* After replacement, carry out adjustment "2 - (1) Coil and core gap adjustment".

#### 5. Coil replacement

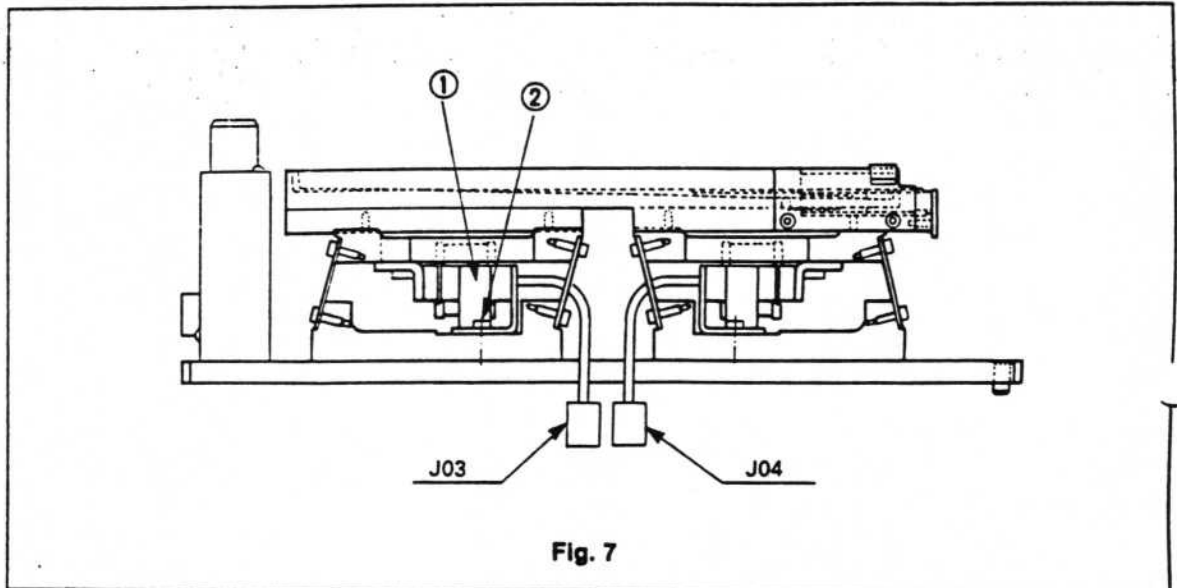


Fig. 7

(1) Remove the connector (J03 or J04) for the coil to be replaced from the main unit (see Fig. 7).

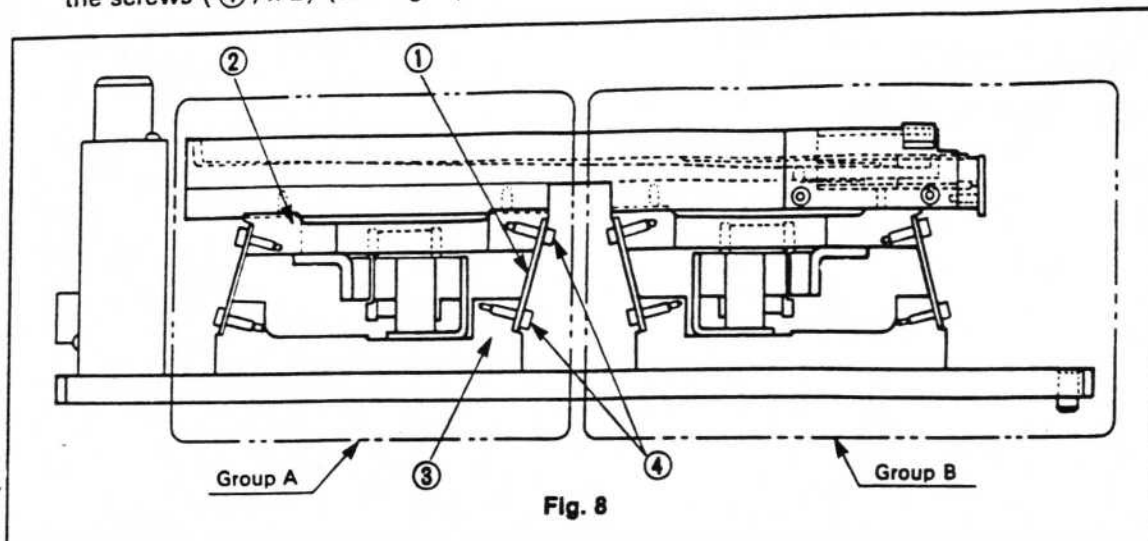
(2) Next remove the screws (②, x 2) holding the coil and replace the coil.

(3) Tighten the screws ② and insert the coil connector firmly.

\* After replacement, carry out "2 - (1) Coil and core gap adjustment".

## 6. Leaf spring replacement

The leaf spring (① in Fig. 8) is attached between the tray base (②) and coil base (③) by the screws (④, x 2) (see Fig. 8).



(1) Replace the leaf spring (after first removing the screws (④, x 2), replace and tighten the screws (see Fig. 8).

(2) Next loosen the screws (④, x 8) for the entire leaf spring group.

(3) While pressing down on the top of tray section (⑤), loosen screws (④). Check that both ends of the leaf spring are in firm contact with the tray base (②) and coil base (③).

\* The tray height adjustment is carried out by operations in (2) and (3).

## 7. Switch button replacement

(1) Grip and pull off the switch button (①) (see Fig. 9).

(2) Press in the replacement switch button.

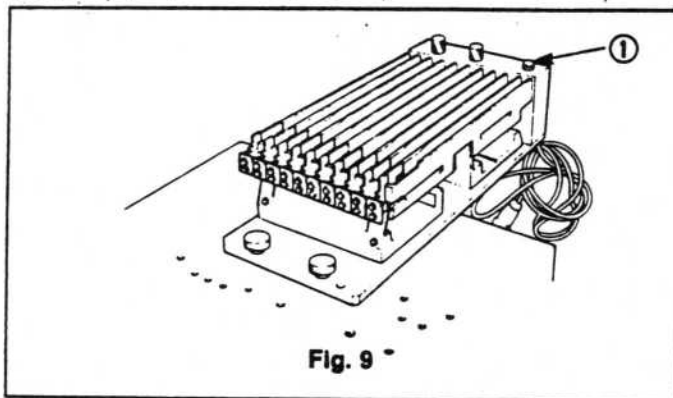


Fig. 9

## 8. Switch lamp (①) replacement

(1) Remove the switch button as in 7 above.

(2) Remove the switch lamp (①) and replace it (see Fig. 10).

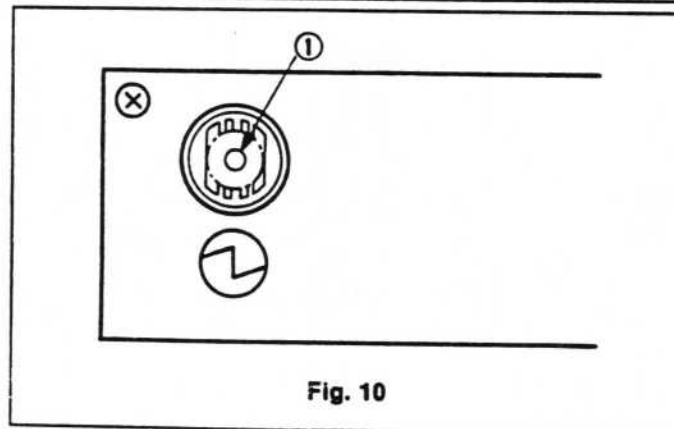


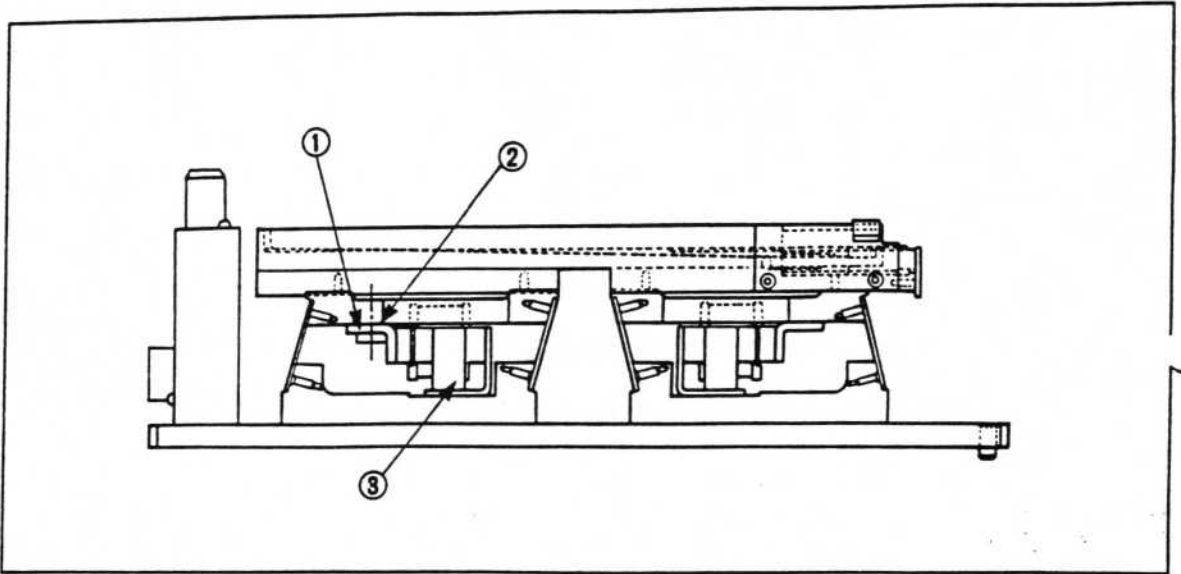
Fig. 10

## 2.

### ADJUSTMENTS

#### 1. Coil and core gap adjustment

Adjustment is carried out on the gap ② with the nut/bolt ①.



- (1) Loosen the nut ① so that the coil ③ can be moved freely.
- (2) Place a thickness gauge in the gap ②, adjusting it to  $0.6 \pm 0.1$  mm.
- (3) Tighten the nut ① and recheck the gap.

\* If the gap is set incorrectly there will not be optimum oscillation.

#### 2. Tray gap adjustment

The tray gap is indicated in Fig. 11. Carry out the procedure below for adjustment.

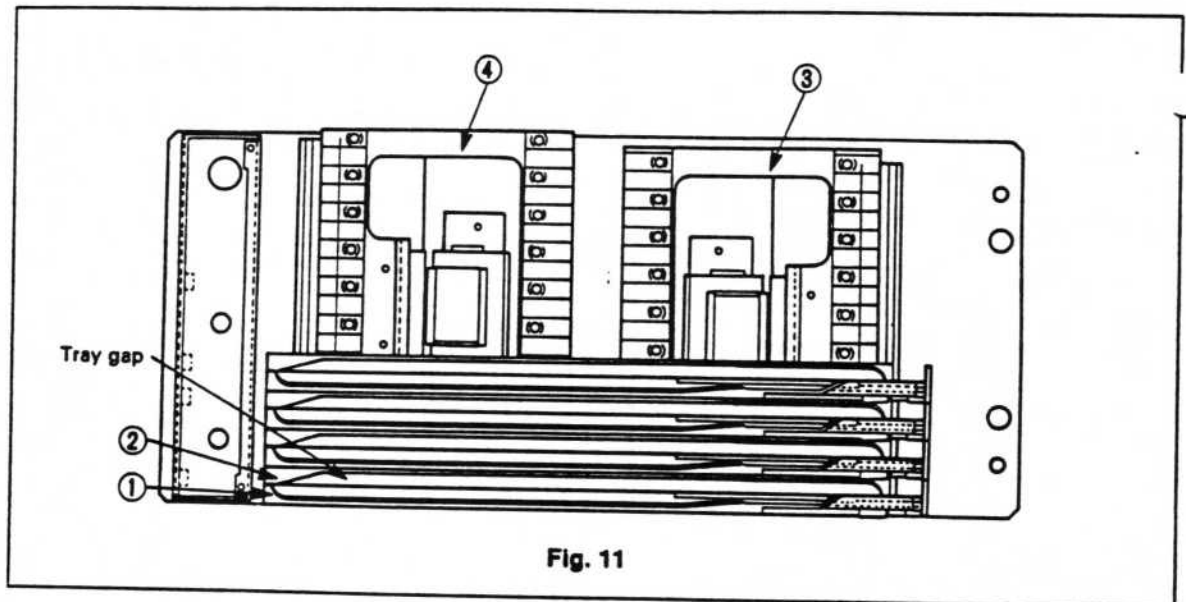
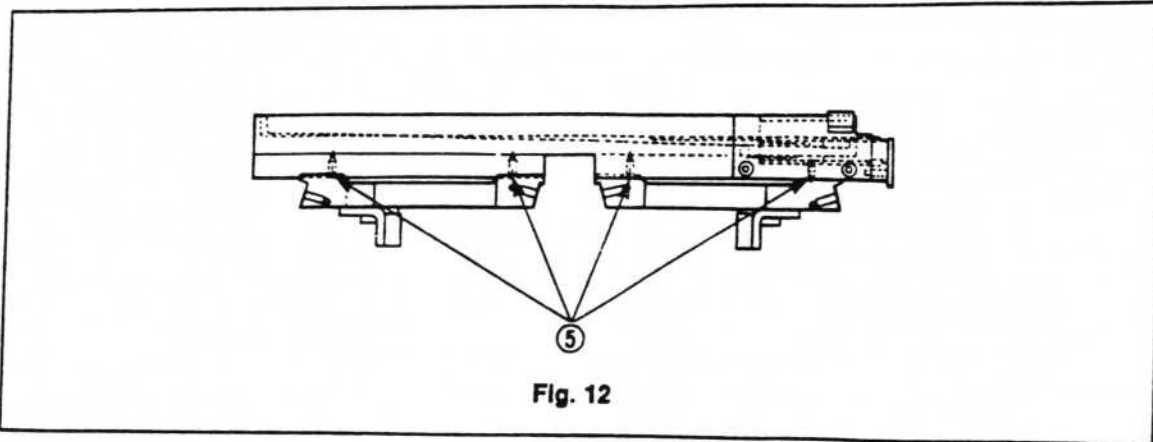


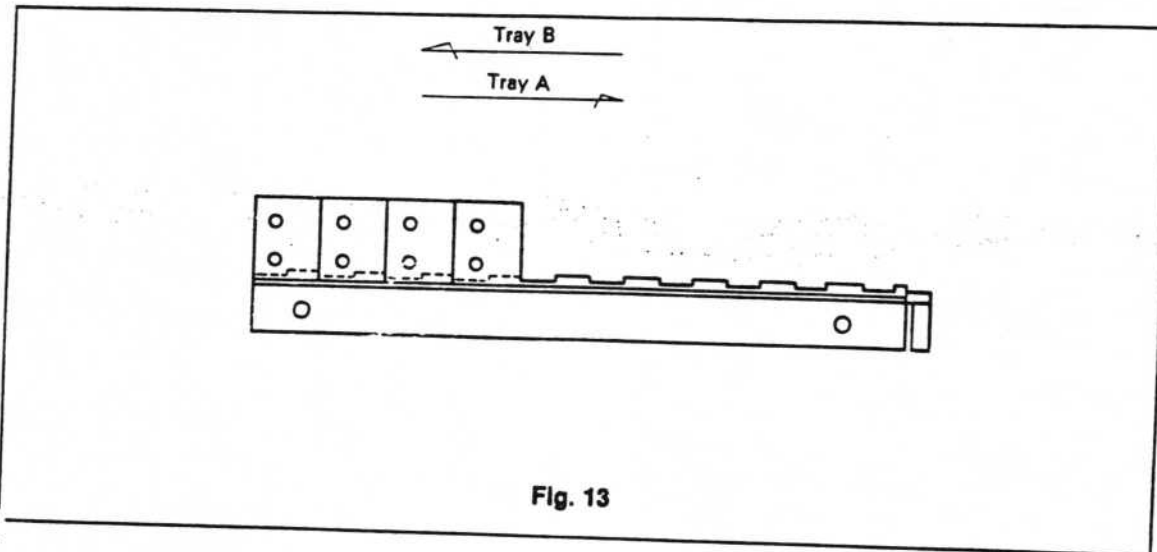
Fig. 11



- (1) First remove the trays A ①, B ② and tray bases A ③, B ④ from the main unit in accordance with section 1-(6) "Leaf spring replacement" (see Fig. 11).
- (2) Loosen all the screws (⑤, x 40) to trays A and B (see Fig. 12)



- (3) Push trays A and B in the directions shown in the next figure (see Fig. 13) and tighten all the screws (⑤ in Fig. 12).



- (4) Attach to the main unit as in section 1-(6) "Leaf spring replacement".  
(5) Adjust the screws (Ⓔ), x 4 shown in the figure. With a thickness gauge check that the tray gap is 0.05-0.1 mm (see Fig. 14).

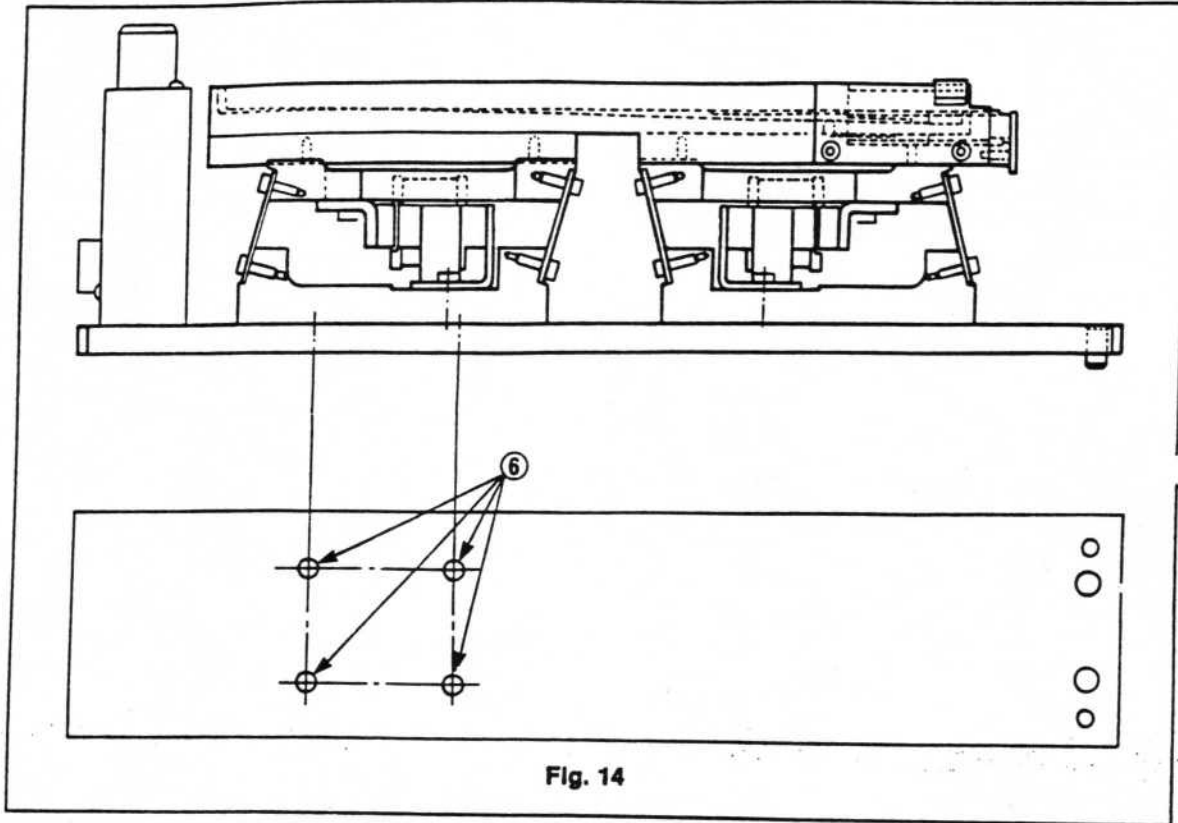
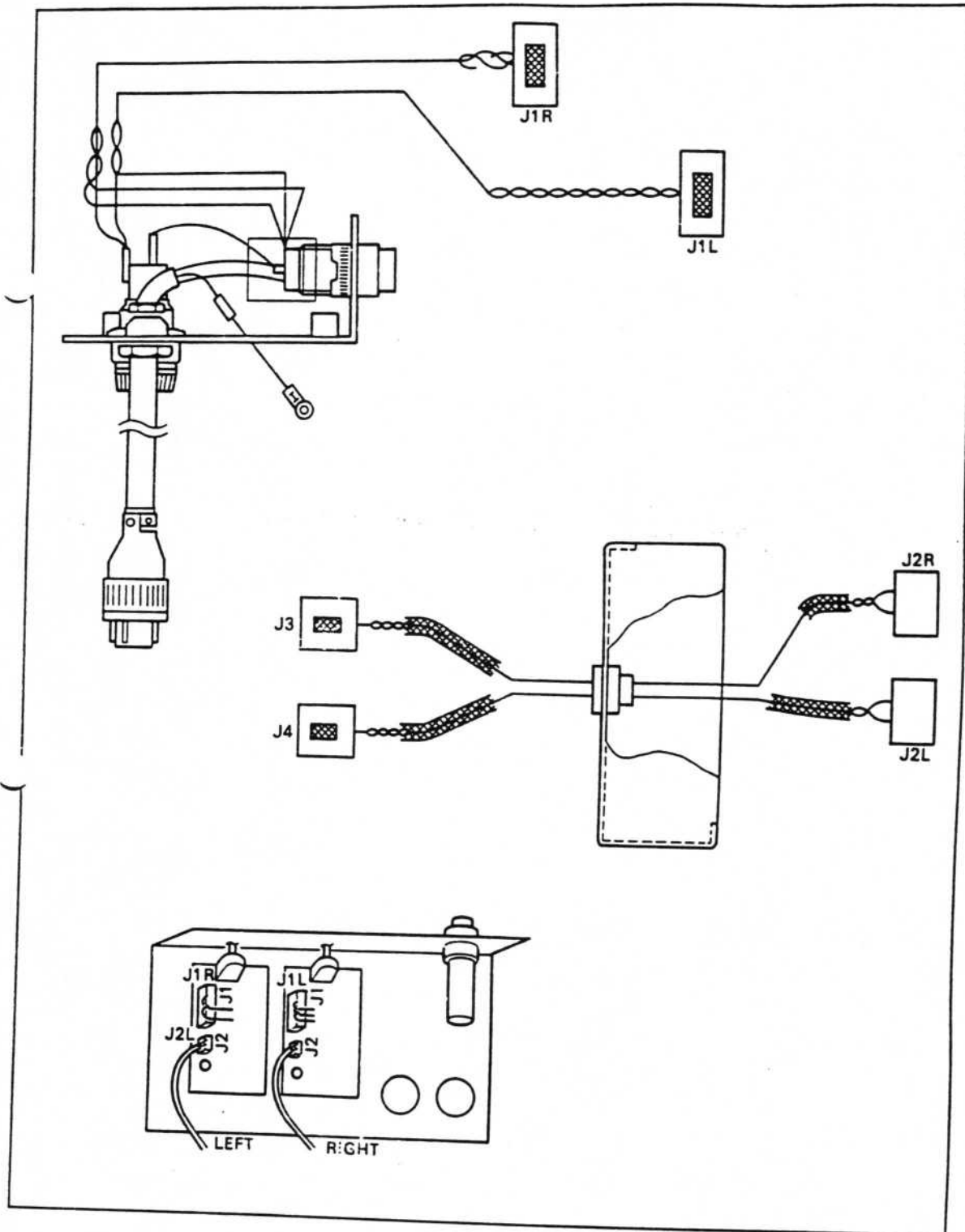


Fig. 14

### 3. \_\_\_\_\_

## ELECTRICAL WIRING DIAGRAMS

Divided into two sections by the 4 screws on the outside of the control box.



# ASSEMBLY BOARD AUTOMATIC CONVEYING UNIT

Section

# 5

1.

## REPLACEMENT

Name of replacement part	Number of parts	Replacement section	Replacement interval	Pro- cedure
Belt	2	Fig. 4 ④ ⑤	Every 2 years - or if the belt is cut, worn or begins to slip on the assembly board	1
Pulley (with bushes)	10 10	Fig. 1 ③ - ⑦	At time of belt, replacement or faulty rotation	2
Pulley shaft	10	Fig. 1 ③ - ⑦	At time of pulley replacement	2
Conveyer wiring assembly	1	Fig. 4 ④	At time of solenoid valve or sensor failure	3
Conveyer motor assembly (motor wiring assembly)	1	Fig. 5 ① - ③	At time of faulty rotation due to motor faulty	4

- For belt replacement, remove the arm ① (see Figs. 1 and 2). The arm can be detached by removing the nut (8 mm) on the rear side of the arm shaft ②. Having removed the arm, the arm on the adjustable board conveyer ① (Figs. 3 and 4) side can be replaced. (When removing the arm, remove also the spring (③ in Fig. 2). Next remove the sensor bracket ③ on the fixed board conveyer ② side (see Figs. 3 and 4). By removing the arm in the same way as for side ①, the belt can be replaced.
- As in the above (belt replacement), first remove the arm, then remove the retaining nut of the pulley ⑤ (of pulleys ③ - ⑦ in Fig. 1) and replace the pulley. Other pulleys can be replaced by removing the nuts on the rear side of each. Pulley replacement is usually accompanied by replacement of the pulley shaft. Also replace the board conveyers (① and ② in Figs. 3 and 4). For the board conveyer ②, first remove the sensor bracket ③.

Note:

Replace also the M liner bush A for each of the pulleys, pushing it firmly into place.

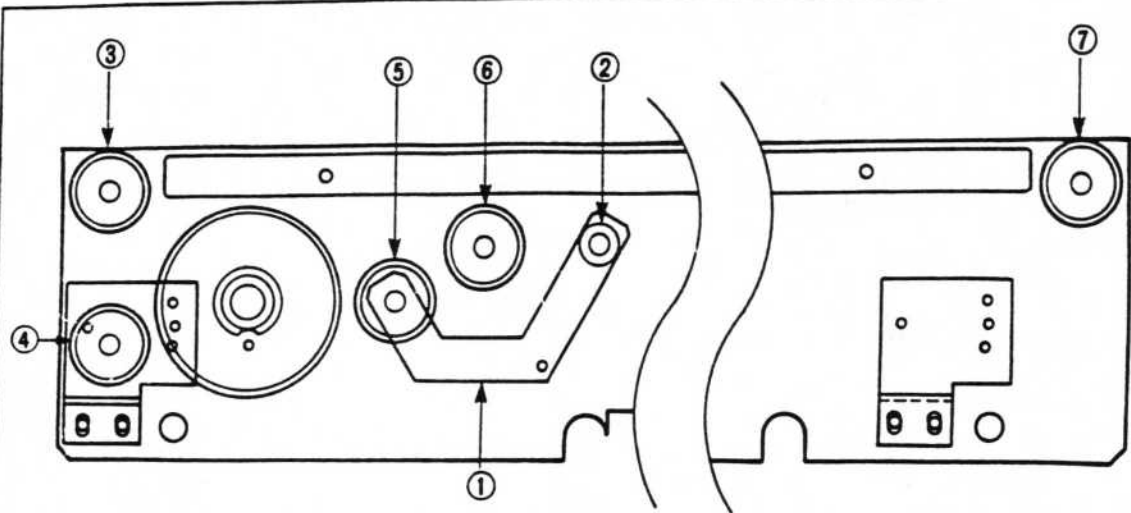


Fig. 1 Board conveyer

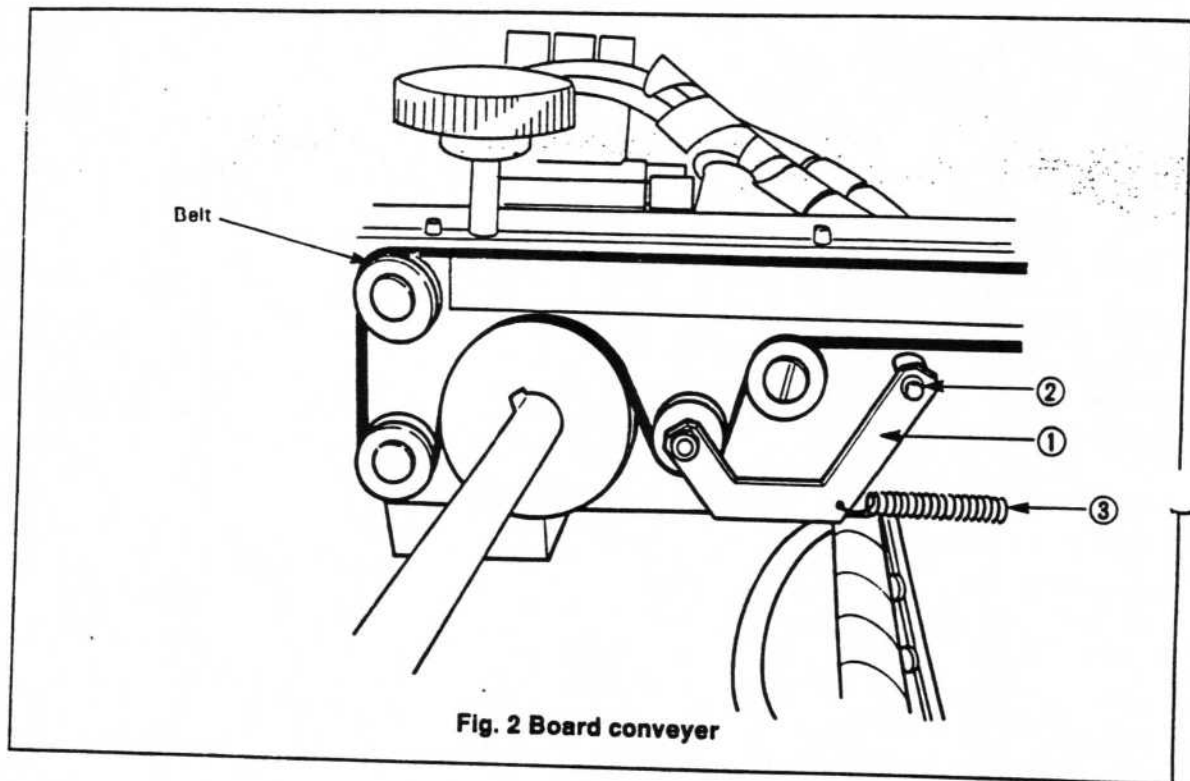


Fig. 2 Board conveyer